SunStar

USER'S MANUAL
PARTS BOOK

Version 03

ISO 9001 Certification of Quality System

FORTUNA

AC Servo Motor series IV

FORTUNA
AC Servo Series 4

3333

1) For at most use with easiness, please certainly read this manual before starting use.
2) Keep this manual in safe place for reference when the machine breaks down.

SunStar SUNSTAR MACHINERY CO., LTD.

1. Thank you for purchasing our product. Based on the rich expertise and experience accumulated in industrial sewing machine production, SUNSTAR will manufacture industrial sewing machines, which deliver more diverse functions, high performance, powerful operation, enhanced durability, and more sophisticated design to meet a number of user's needs.

2. Please read this user's manual thoroughly before using the machine. Make sure to properly use the machine to enjoy its full performance.

3. The specifications of the machine are subject to change, aimed to enhance product performance, without prior notice.

4. This product is designed, manufactured, and sold as an industrial sewing machine. It should not be used for other than industrial purpose.

SunStar SUNSTAR MACHINERY CO., LTD.

FORTUNA
AC Servo Series **4**

USER'S MANUAL

CONTENTS

1

SAFETY INSTRUCTION

Be sure to read and keep in mind the following instructions before you install and use the FORTUNA SERVO MOTOR.

1) Use and Purpose

This product is designed, manufactured, and sold as an industrial sewing machine. It should not be used for other than industrial purpose.

2) Working Environment

①Power Source
  • It is desirable that voltage of the power source be kept within the range of 10% of the rated voltage.
  • It is desirable that frequency of the power source be kept within the rage of 10% of the rated frequency. (50/60㎐)
  • The SERVO MOTOR can be expected to work normaly only in case the foregoing things are kept.

②Electromagnetic Noise
  • It is desirable that those equipments causing strong electromagnetic field or high frequency not use the same electrical outlet as this on and stay away from it.

③Temperature and Humidity
  • Keep the ambient temperature above 5 degrees and below 40 degrees Centigrade.
  • Never use it outdoors and avoid direct ray of light.
  • Keep it away from an hot object like a stove.
  • Keep the ambient humidity above 30% and below 95%.

④Never use it near gases and explosives.

⑤Do not use it at a spot located 1,000m or higer above sea-level.

⑥Keep the storage temperature higher than 25 degrees below zero and lower than 55 degrees Centigrade when not in use.

3) Installation

Follow the instruction carefully when installing it.

①Be sure to start installing it after pulling the power plug off the outlet.

②Fix the cable so that it may not move, and do not allow the moving parts like belts to be interfered with.(Keep distance of at least 25mm from them.)

③Be sure to have the Controller and the sewing Machine grounded.

④Be sure that the voltage of power source fits the specification of the Controller before the power is on.

⑤Be sure to use Safety Extra Low Voltage when an extra item or an accessory is fitted into the Controller.

4) Disassembly

①Indisassembling it, be sure to wait at least 360 seconds before taking any action after pulling the plug off the power source after turning it off.

②When pulling off the plug from the power source, be sure to hole the plug itself instead of the wire connected to the plug.

5) Service and Maintenance

① Make sure that service and maintenance are carried out by a skilled technician.
② Never try to operate with the Motor and the Controller open.
③ When inserting a thread into or touching the machine, be sure to turn the power off and step down from the platform.
④ Be sure to use standard products specified for replacement of parts.

6) Other Safety Instructions

① Tack care not to let your fingers touch any moving parts including belts.
② In case of remodelling or fitting of additional device, be sure to follow safety standards and do not ever try to go ahead based on your own judgments.
③ Do not try to operate with the safety device removed.
④ Take care not to let water or coffee or something like those admitted into the Controller or the Motor.
⑤ Never drop the Controller or the Motor to the ground.

※The instructions presented above are for the safer and more proper operation of the Fortuna Servo Motor. Ignoring such instructions could cause damage to the machine or physical injury of the user. Please follow all the instructions when operating the machine.

PRECAUTIONS BEFORE USE

1. Do not turn on the power while stepping on the pedal.
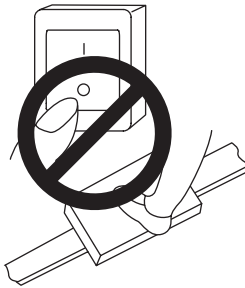
2. Turn off the power when leaving the servomotor overnight.
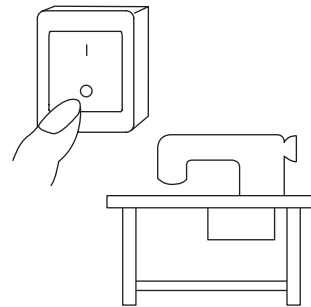
3. Turn off the power when servicing the servomotor or changing the needle.
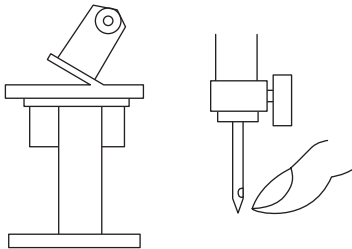
4. Be sure to keep the servomotor securely grouned.
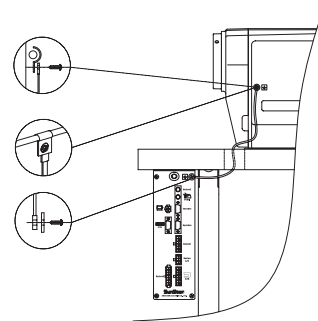
5. Do not connect multiple servomotor power plugs to the same power strip.
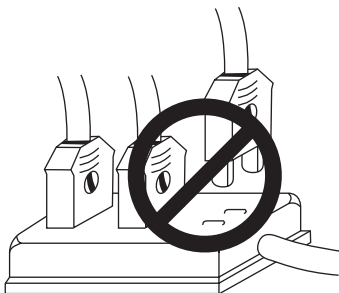
6. Install the servomotor away from noise sources, such as high-frequency equipments and welding machines.

Noise
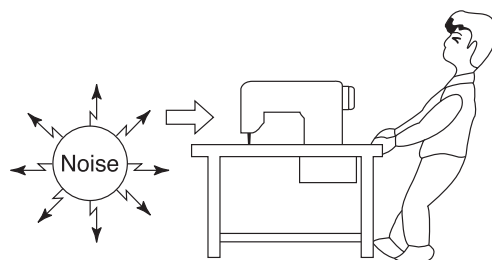
7. Avoid electrical shock when servicing the controller box. (Wait for 6 minutes before opening the cover after turning off the power.)
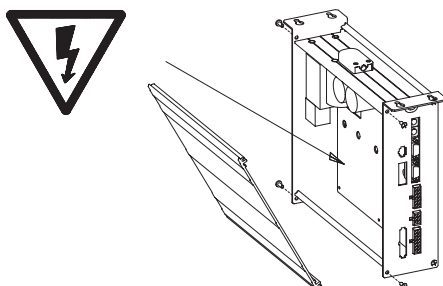
8. When an error message "Er" sppears on the digital display, take a note of the "Er" code, and then turn on and off before resuming operation(Contact the local dealer if "Er" message persists on the display)

131 Er

A B C D E F
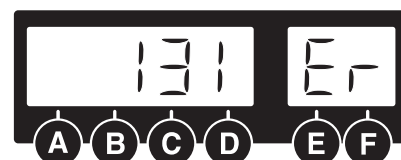
9. Clean it every two or three weeks so that no dirt or a dirty substance may be piled up.
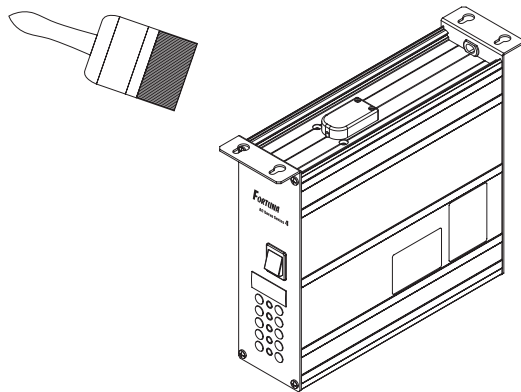
10. When replacing the fuse, use a standard item, opening the cover as shown in the diagram.
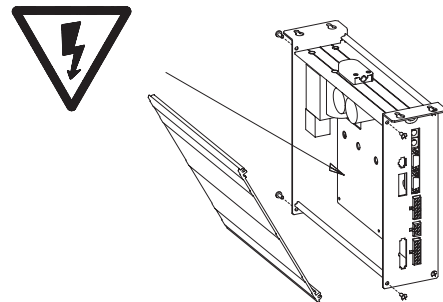
F1	250V/15A [65TL/31.8mm]
F2	250V/15A [65TL/31.8mm]
F3	250V/1A [50T/20mm]
F4	250V/6.3A [50T/20mm]

11. Make the length of the cable connected with an outside parts like stand-up pedal as short as possible.

3
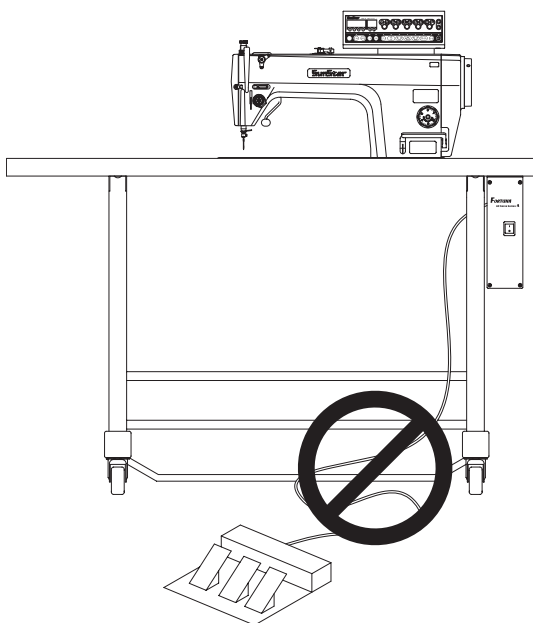
LOCATING AND USING PARTS OF THE CONTROLLER BOX

1) Front and back of control box

Control box front (Full Option Type)	Control box back (Full Option Type)
AC Power switch	Control box grounding part
	AC Power Input Power Cable
	Option 2 Connector
	Pedal Connector
	Encoder Connector
	Motor Power Connector
	P/U Connector
	Position Detector Connector
	Option 1 Connector
	A/B Button Connector
	Solenoids Connector
	Option 3

Control box front (Economic Type)	Control box back (Economic Type)
AC Power switch	Control box grounding part
Simple Controller Board	AC Power Input Power Cable
	Option 2 Connector
	Pedal Connector
	Encoder Connector
	Motor Power Connector
	P/U Connector
	Position Detector Connector
	Option 1 Connector
	A/B Button Connector
	Solenoids Connector

2) Control box side

① Caution

WARNING
경　고

Hazardous voltage will cause injury.
Be sure to wait at least 360 seconds before
opening this cover after turn off main switch and
unplug power cord.

고압 전류에 의해 감전될 수 있으므로 커버를 열 때
는 전원을 내리고 전원 플러그를 뽑고 나서 360초간
기다린 후 여십시오.

② Specification

FORTUNA
AC SERVO SERIES 4

MODEL	
POWER	V,50/60Hz
Current(MAX)	5.0A
IP	40
SERIAL NO.	

CE

SUNSTAR ELECTRIC CO.,LTD.
MADE IN KOREA

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INSTALLATION

1) Attaching controller to table

① As in the figure, attach control box to the lower right of the table with 15mm fixing screws.

The underside of the table, front part

Right table leg

Area where control box is to be attached
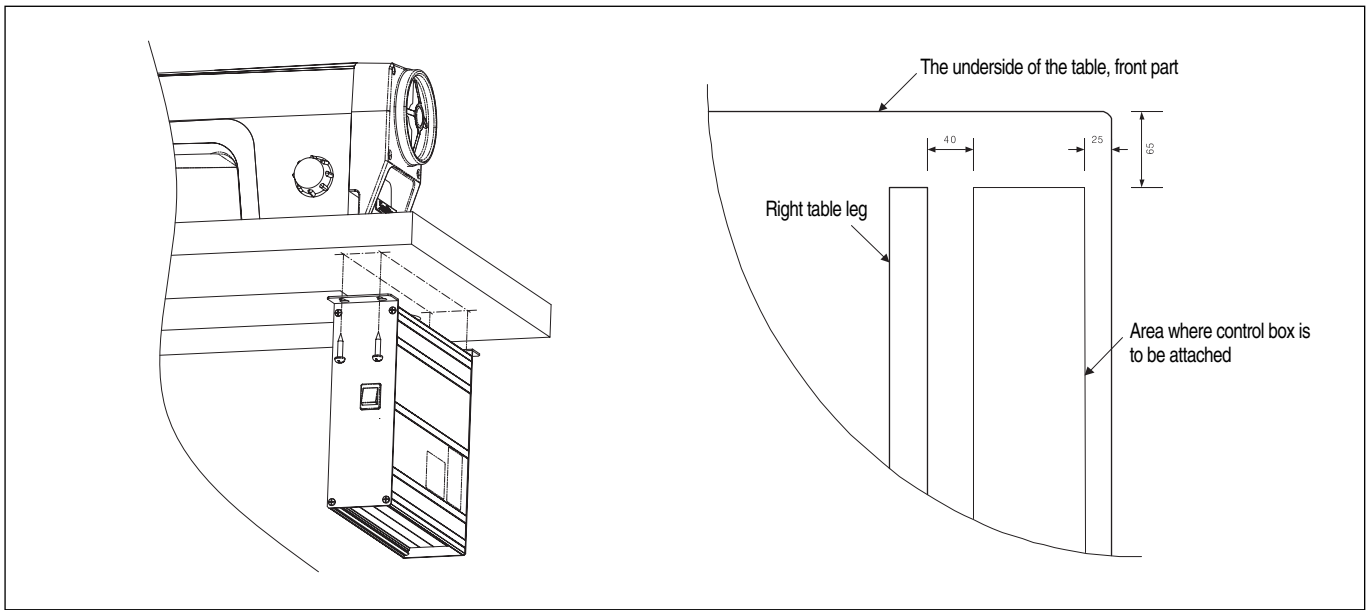
2) Attaching pedal unit

① As in the figure, attach pedal unit bracket to the underside of table with 15mm fixing screws.
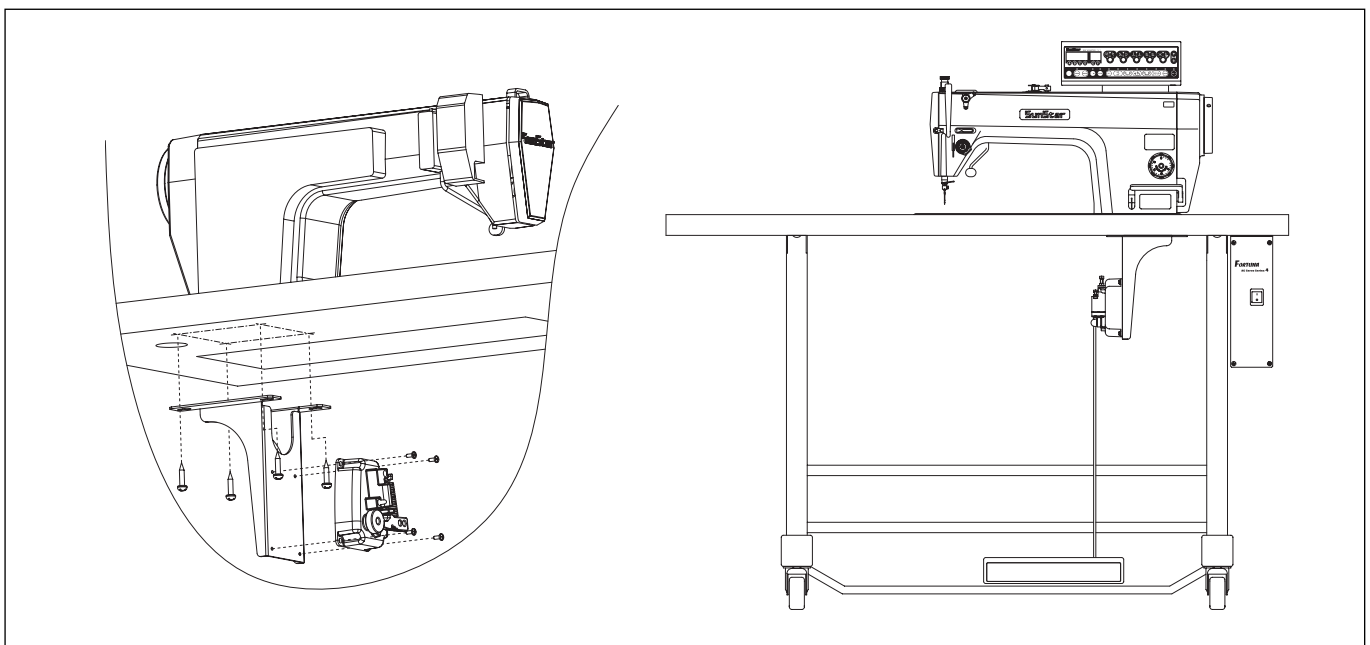
② Attach pedal unit to the fixing holes on one side of pedal unit bracket.

③ Pedal unit bracket should be fixed to the area where the bar linked to the pedal that is to be attached to table leg becomes vertical.
   (The area where pedal unit bracket is attached depends on where the pedal is.)

3) Installing and adjusting knee lifter solenoid

(1) For Sunstar KM-2300 Sewing Machine

①Assemble Ornamental panel of knee lifter solenoid on the back of KM-2300 body

②Attach knee lifter solenoid on bracket A.

③Attach the bracket A fixed on the knee lifter solenoid.

④After attaching crank on the solenoid shaft, connect to the machine.

⑤Put cover over solenoid.

⑥Connect grounding cable.

Solenoid bracket A
Presser foot Solenoid Cover
Grounding Cable
Solenoid Crank
Solenoid Cover
※ KM-2300 Back
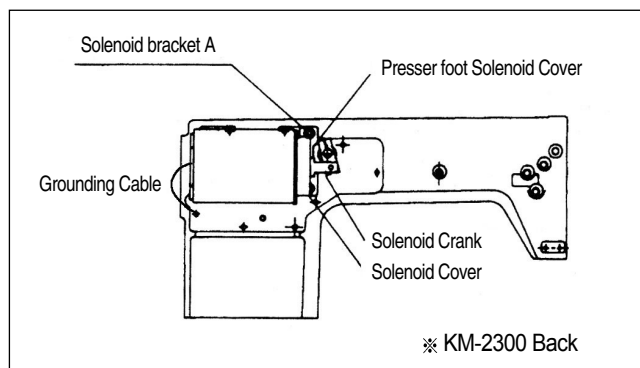
4) Needle Bar Up/Down Stop Position Setting

(1) Installing Position detector (KM-2300Series, SC-7300Series)
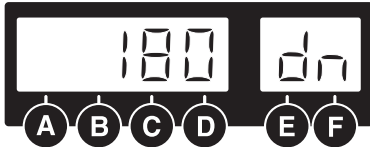
①Synchronizer is attached on the machine upon shipment.

②When changing and fixing synchronizer, see the manual.

(2) Setting needle bar up-/down- stop position with using program unite (KM-2300Series, SC-7300Series)

- Fortuna Series IV allows a user set up-down stop position by using program unite without changing setting of synchronizer.
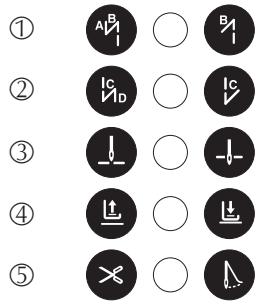
①Setting needle bar up-down stop with using optional program unite.

①Turn on the down-stop icon lamp by pressing needle bar up-/down-stop button on the program unit to set needle bar down-stop position.	
②When the up stop lamp on, press needle bar up-down stop button with pressing (PROG) the button. After that, as in the figure letter showing information on the setting target and number pointing the current position will blink.	140 UP A B C D E F
③Turn the pulley forward manually to move the needle bar to the desired position. The screen displays changing position of needle bar.	40 UP A B C D E F
④When the needle bar moves to the desired position, save the position by pressing (ENTER) key. Then, the screen automatically returns to the initial screen with a buzzer.	3333 bt A B C D E F

[Caution]

Returning to the initial screen by pressing (PROG) button without pressing (ENTER) button will not save reset values.

⑤ Furthermore, turn on the down-stop icon lamp by pressing needle bar up-/down-stop button on the program unit to set needle bar down-stop position.	
⑥ When the down-stop lamp turns on, press (PROG) button while pressing needle bar up-/down-stop button. Then, as in the figure right, the information on what is to be set and the numbers that tell the current position of needle bar will be shown.	140 dn A B C D E F
⑦ Turn the pulley forward manually to move the needle bar to the desired position. The screen displays changing position of needle bar.	180 dn A B C D E F
⑧ When the needle bar moves to the desired position, save the position by pressing (ENTER) key. Then, the screen automatically returns to the initial screen with a buzzer.	3333 bt A B C D E F
[Caution] Returning to the initial screen by pressing (PROG) button without pressing (ENTER) button will not save reset values.	

② Setting needle bar up-/down-stop position by using simple controller board (front OP).

① Turn on the up-stop icon lamp by pressing needle bar up-/down-stop button on the simple controller board to set needle bar up-stop position.	
② When the up-stop lamp turns on, press "E" button while pressing needle bar up-/down-stop button ("C"). Then, as in the figure right, the numbers that tell the current position of needle bar will be displayed.	140
③ The operator turns the pulley forward manually to move the needle bar to the desired position. The screen displays changing position of needle bar.	40
④ When the needle bar moves to the desired position, save the position by pressing "C" key. Then, the screen automatically returns to the initial screen with a buzzer.	3333
[Caution] Returning to the initial screen by pressing "E" button without pressing "C" button will not save reset values.	

⑤ To set needle bar down stop position, press needle bar up-down stop button of simple controller board to make on the icon lamp of needle bar up stop.	
⑥ When the down stop lamp on, press needle bar up-down stop button "C" with pressing "E" button. After that, number pointing the current needle bar position will blink.	140
⑦ Turn the pulley forward manually to move the needle bar to the desired position. The screen displays changing position of needle bar.	180
⑧ When the needle bar moves to the desired position, save the position by pressing "C" key. Then, the screen automatically returns to the initial screen with a buzzer.	3333

[Caution]
Returning to the initial screen by pressing "E" button without pressing "C" button will not save reset values.

[Caution] The names of buttons on simple controller board are as follows. ① A Button switch(Switch for initial Reverse) ② B Button switch (Switch for end reverse) ③ C Button switch (Switch for needle bar up-down stop when the machine stops) ④ D Button switch (Switch for automatic presser foot ascending when the machine stops) ⑤ E Button switch (Switch for program)	① ② ③ ④ ⑤

5) Installing program unit

①As in the figure below, attach program unit bracket to program unit with three fixing screws. As in the figure, attach the bracket with program unit to the head of machine firmly with two fixing screws.
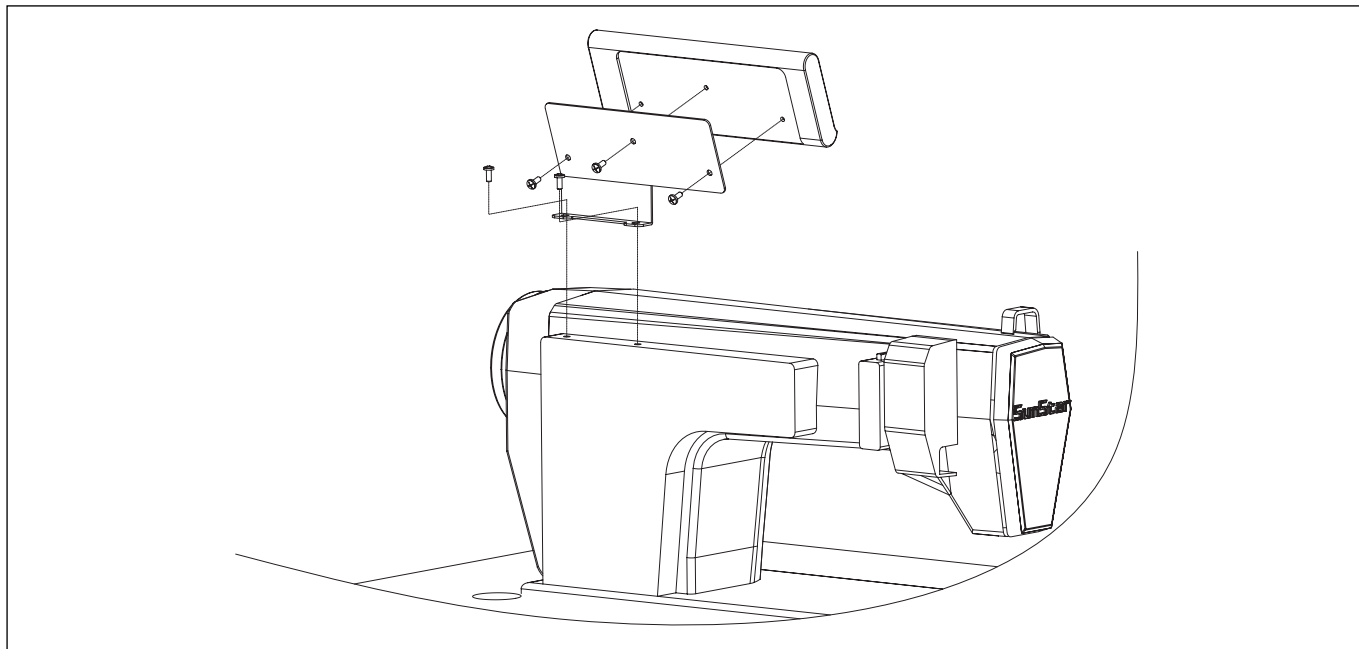
6) SunStar machine installed with program unit
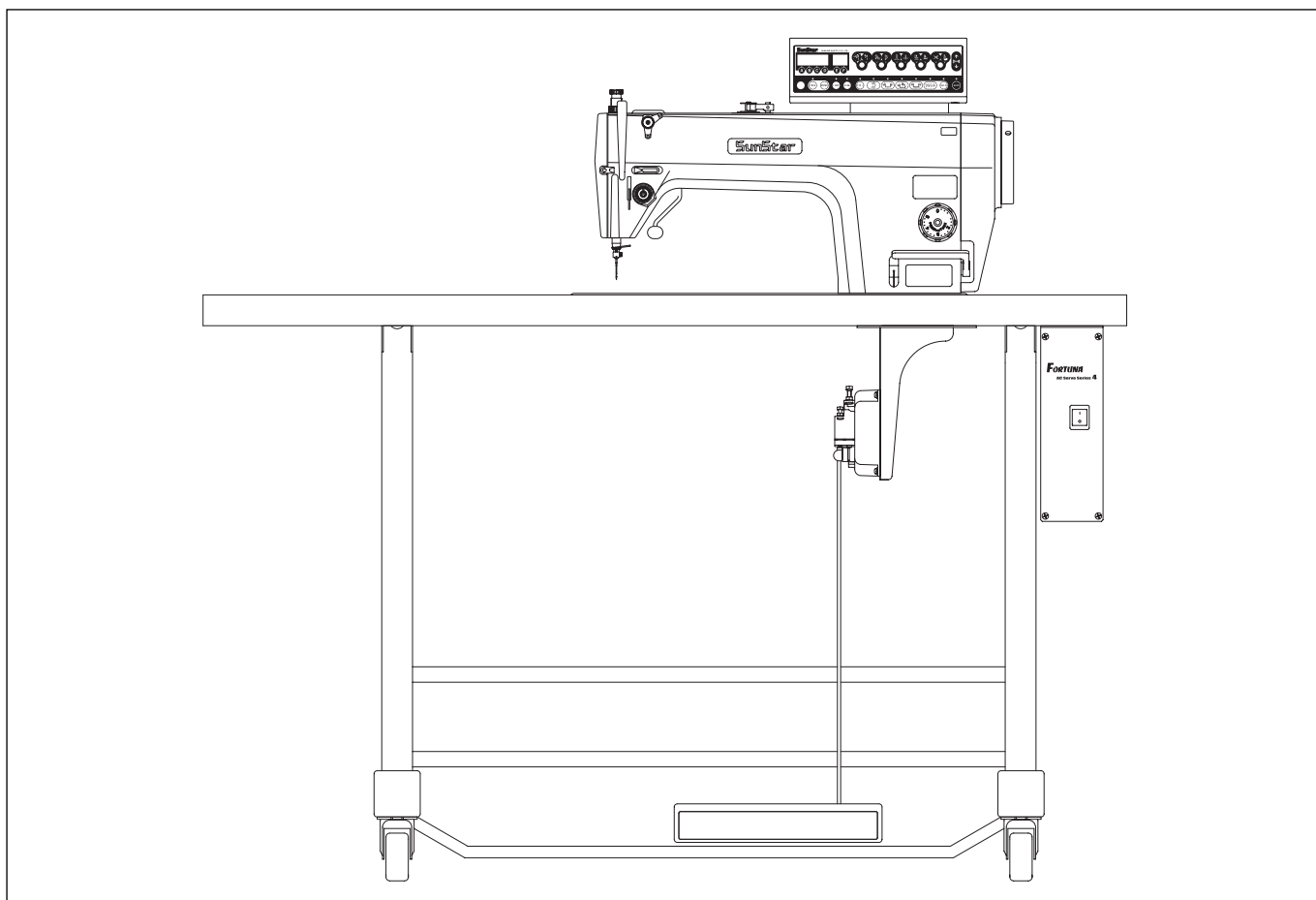
5

WIRING AND GROUNDING

1) Specification of the power plug

(1) Single phase 100V~120V
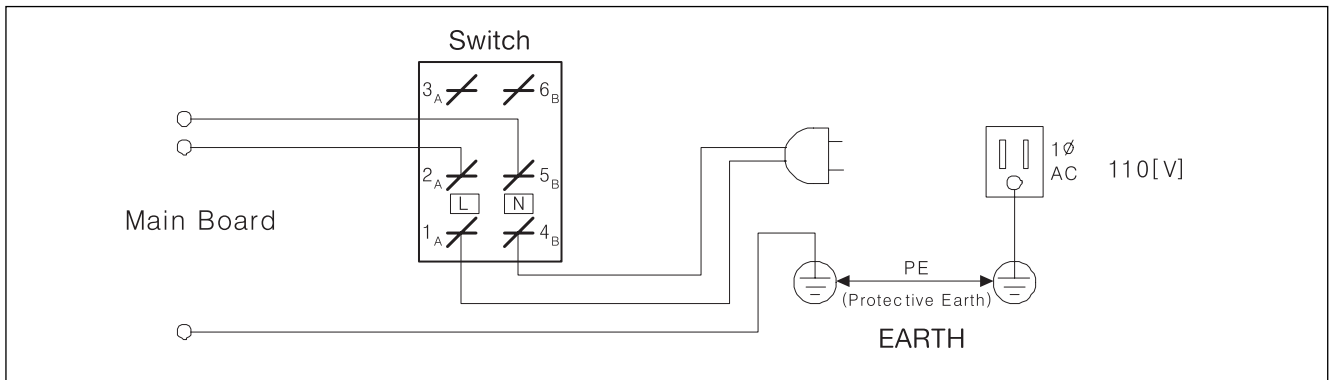
(2) Single phase 200V~240V
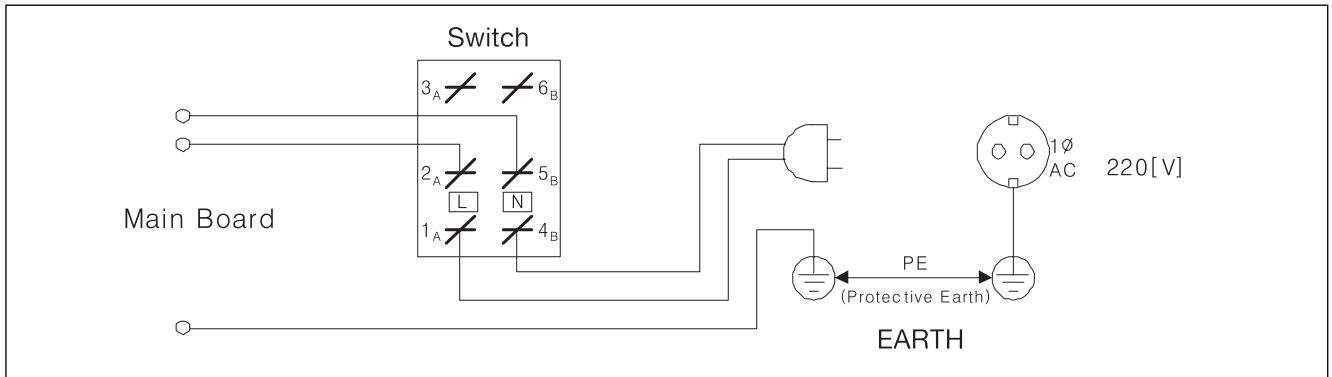
(3) Three phase 200V~240V
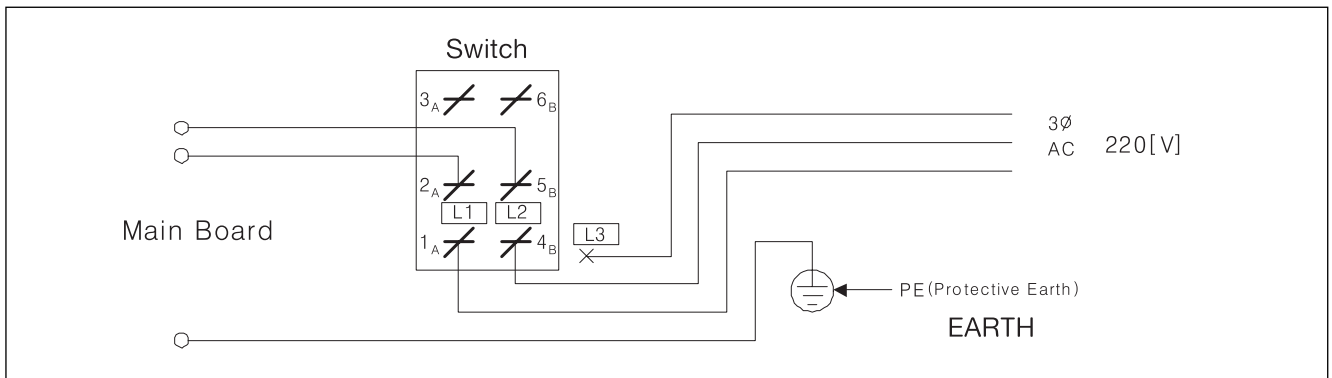
※Be sure to connect Protective Earth

2) Specification of electric current in wiring of power plug

Be sure to use wiring materials which can stand electric current of higher than 15A.

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3) Names and Explanation of external connector in control box

① Solenoid Connector (5566-16P)

```
              [ Pin Number ]

  16 | 15 | 14 | 13 | 12 | 11 | 10 | 9
  8  | 7  | 6  | 5  | 4  | 3  | 2  | 1
```

1, 9: Back Tack solenoid	5,13: Left needle control solenoid
2,10: knee lifter solenoid	6,14: Right needle control solenoid
3,11: Trimming solenoid	7,15: Thread release solenoid
4,12: Wiper solenoid	8,16: Auxiliary solenoid

② Basic switch connector (5566-8P)

```
        [ Pin Number ]

   8 | 7 | 6 | 5
   4 | 3 | 2 | 1
```

1,5: Manual Back tack button [A]	3,7: Knee lifter solenoid switch
2,6: Back tack Insert/Delete Button [B]	4,8: Safety Switch

③ Switch and lamp connector (5566-14P)

```
              [ Pin Number ]

  14 | 13 | 12 | 11 | 10 | 9 | 8
  7  | 6  | 5  | 4  | 3  | 2 | 1
```

1, 2, 7 : GND	9 : 4/4
3 : Left switch LED	10 : 3/4
4 : Right switch LED	11 : 2/4
5 : Left switch	12 : 1/4
6 : Right switch	13 : Switch-CNT
8 : VCC (5[V])	14 : Switch-HALF

④ Extension connector (5566-20P)

```
                    [ Pin Number ]

  20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11
  10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1
```

1, 2, 9, 10 : 12[V]	13 : Output 12
3~8 : GND	14 : Output 13
11, 12, 19, 20 : VCC (5[V])	15 : Output 14
13~18: Extension Port	16 : Output 15
	17 : External Input 00
	18 : External Input 01

4) Changing solenoid supply voltage (Basic setting values upon shipment: J19)

※It is for a good operation of solenoid when AC input voltage changes.

① Setting values of solenoid supply voltage against input voltage (input voltage 220V series)

Solenoid with the rating current of 30V

Input Voltage	Setting Values
Less than 210V	J20
210V~230V	J19
More than 230V	J18

Solenoid with the rating current of 24V

Input Voltage	Setting Values
Less than 180V	J20
180V~190V	J19
More than 190V	J18

② Setting values of supplied voltage to solenoid against input voltage (Input voltage: 110V)

Solenoid with rating current of 30V

Input Voltage	Setting Values
Less than 100V	J20
100V~120V	J19
More than 120V	J18

Solenoid with rating current of 24V

Input Voltage	Setting Values
Less than 90V	J20
90V~100V	J19
More than 100V	J18

③ Setting supplied voltage
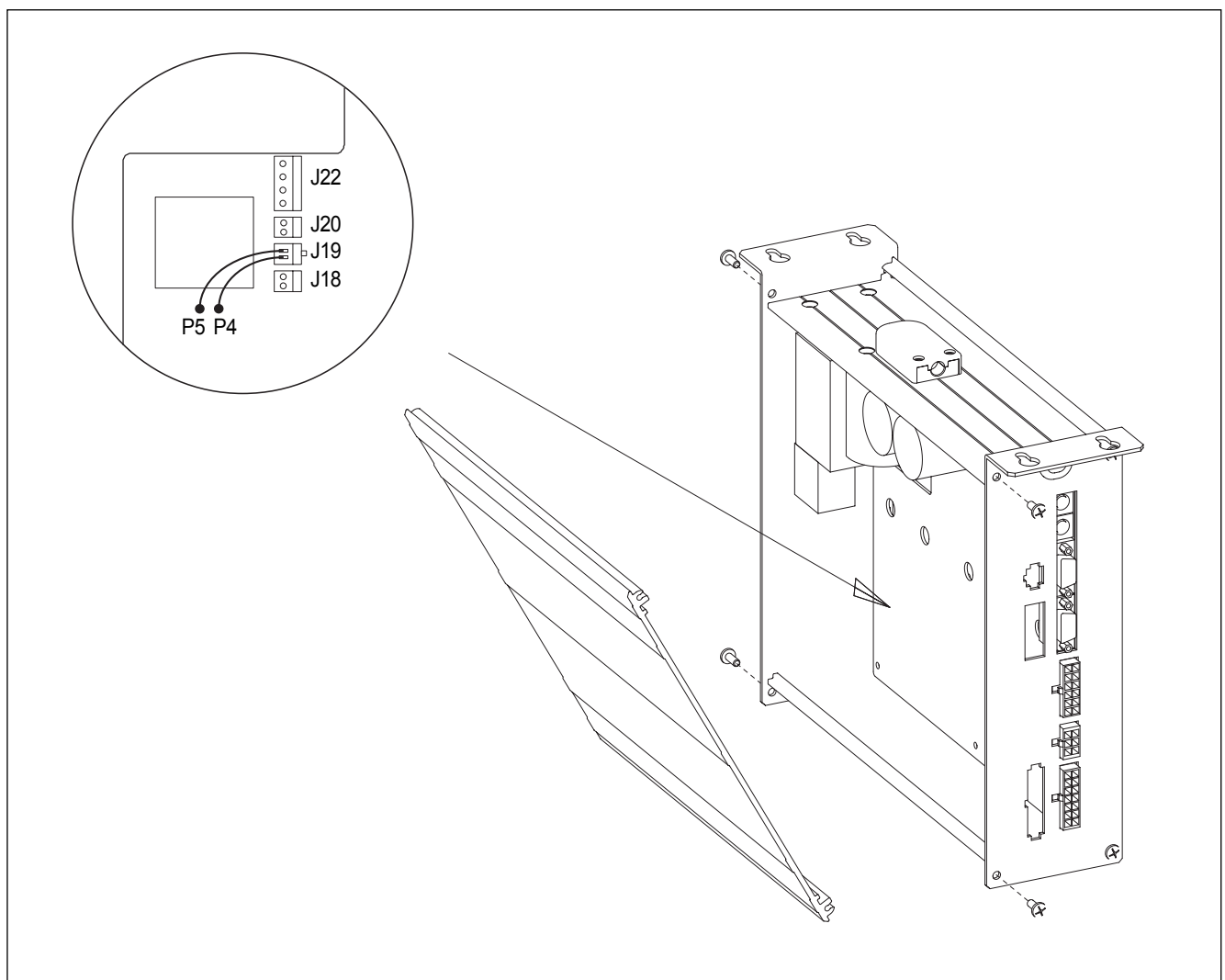
6

CONNECTION THE EARTH WIRE OF THE SEWING MACHINE AND MOTOR

▶ Method

As in the figure, connect grounding conductors (green or green/yellow) that link the machine and the controller. Check if grounding part of power is connected to the grounding conductors.

⚠ Caution	Failure to ground the motor can cause abnormal operations, such as overspeed rotation or unwanted stitching.
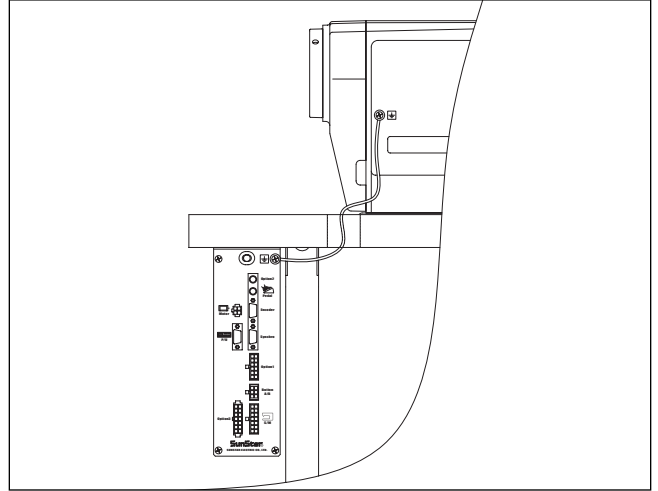
7

THINGS TO BE CHECKED AFTER INSTALLATION

1) Before the power is on...

① Make sure that the incoming voltage is in accordance with that shown in the name plate of the Control box.

② Check whether the following connectors are connected.

③ Check to see the fixing nuts for pulley are tightly fastened.

④ Check whether the sewing machines are right kinds (Chain Stitch S/M, Lock Stitch S/M)

⑤ Check the rated voltage for Solenoid (Refer to "How to change the electric voltage supplied for Solenoid"))

2) After the power is on...

① Check whether the program unit is working.

② Check the direction of rotation of the Sewing Machine.

　• In case the direction of rotation is not right, action shall be taken to change set it right, referring to "the methods of changing the program and the list of changing functions" (N. 65 in Group "A")

③ Check to see whether there are abnormal heat, smell or noise nearby.

　• In case there are, turn the power off and call our regional office.

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PROGRAM UNIT PART NAMES AND METHOD OF USE

1) Program unit part names
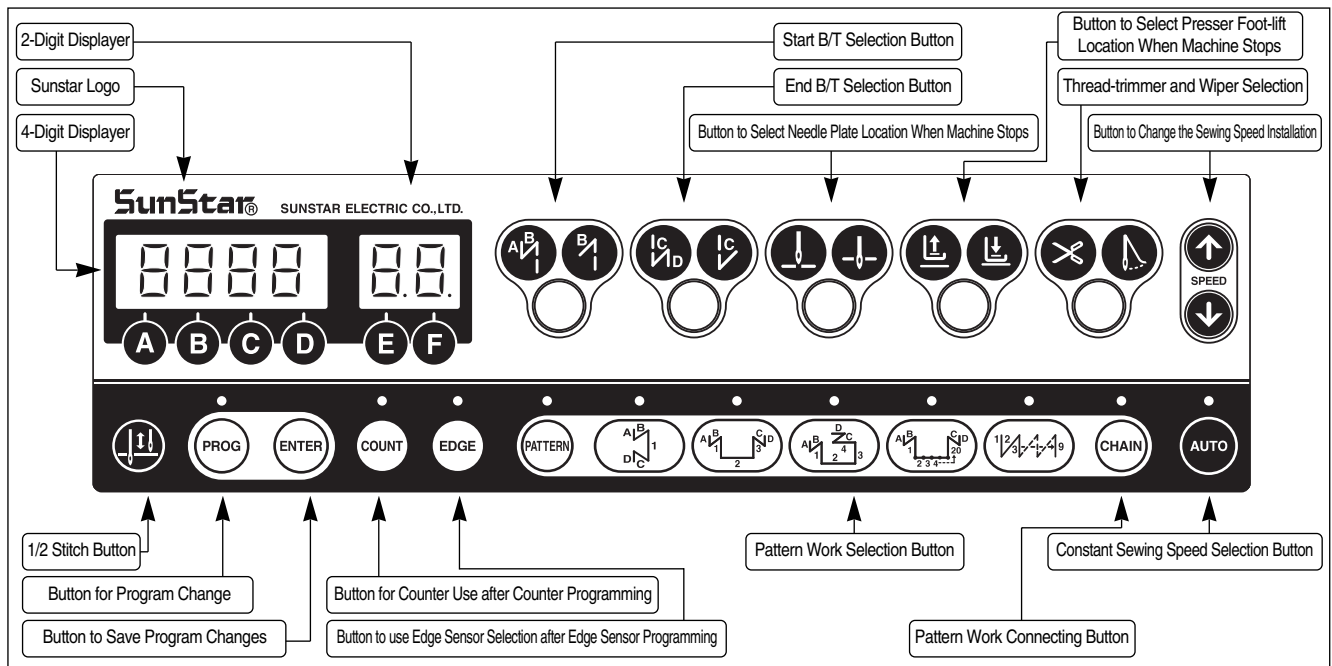
2) Program Unit Method of Use

(1) 4-Digit Displayer and 2-Digit Displayer Functions and Method of Use
A. 4-Digit Displayer and 2-Digit Displayer Functions

① When you turn the power on, you will see a screen as shown in the figure. The 4-digit displayer shows the start and end B/T sewing and the 2-digit displayer shows the current abbreviation for the letters or numbers shown in the 4-digit displayer (bt: the abbreviation for back tack),	<Initializing screen>
② The 4-digit displayer shows the error number for each type of error discovered and also shows the programmed value after it has been programmed. The 2-digit displayer shows the number of the parameter specific item's content or name which is shown in the 4-digit displayer.	<Example of error detection> <Example of selection of number 2 item in Group A>

[Caution]
The 4-digit displayer and 2-digit displayer show the current condition. Therefore the user should always check it before using the machine.

B. Method of Use: 4-Digit Displayer and 2-Digit Displayer

    a. Method to change the start and end B/T stitch numbers

In order to change the start B/T stitch numbers which is programmed when you first purchase this machine, you must use the **A** , **B** buttons. If you want to change the end B/T stitch numbers, you must use the **C** , **D** buttons. • The program range is from 0 to 9. (Ex: How the screen looks when changing both start and end B/T stitch numbers to 4).	4444 bt A B C D E F

    b. Method to check or change the specifics of the parameter

① Press the (PROG) button and as you press it, also press the **A** button. Then you can either check or change the programming items for the parameter of group A. (A group : **A** , B group : **B** , C group : **C** , D group : **D**) ※ Users should turn the machine off to select B, C, or D group. While pressing the (PROG) button, turn the power switch on. The screen will be changed to the initial screen after showing the "PrEn" message. Then, the users can select B, C, or D group by pressing B, C, or D button while holding program (PROG) button.	Pr 1 00 A B C D E F
② You can move to the parameter item you want with the **E** and **F** buttons. The parameter item number will appear in the 2-digit displayer and the wanted value will appear in the 4-digit displayer. (Ex) Screen showing the maximum speed limit preset in the item 2 of A group)	4000 02 A B C D E F
③ After using the **C** (increase) button and **D** (decrease) button to choose the value you want, press the (ENTER) (Enter) button and save the value you chose. (Ex: Reducing the maximum sewing speed limit from 4000RPM to 3000RPM).	3000 02 A B C D E F
④ After saving, press the (PROG) button and go back to the initial screen.	3333 bt A B C D E F
[Caution] • Be aware that if you don't press (ENTER) after changing the programmed value for the parameter item, the value will not be saved. • When the B, C, or D group selection is completed, users should turn off the machine first and restart to secure the selected group. • If the user changes the programmed value from the parameter specifics carelessly, the user may cause break down or physical damage to the machine. The user must therefore be well-trained before changing the parameter group.	
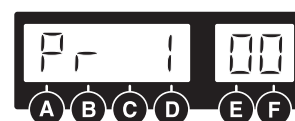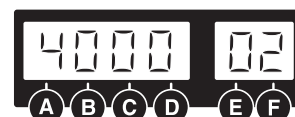
(2) Method of Use : ½ Stitch Button Function

① When necessary, make ½ stitches by pressing the ½ stitch ((icon)) button.
② When the needle plate makes a down stop, shortly press the ½ stitch ((icon)) button once and the needle plate will make an up stop.   And when the needle plate makes an up stop, shortly press the ½ stitch ((icon)) button once and the needle plate will make a down stop.
[Caution] Be aware that if you are continuously pressing the ½ ((icon)) button, the machine will keep on moving at the ½ stitch ((icon)) speed.

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(3) Method of Use: Start B/T Button

This button is used when the user wants to prevent threads from loosening at the end of the sewing work. If the user presses this button in sequence, the location on the lights will change. This button offers the following three functions.
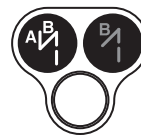
When sewing starts, B/T sewing does not operate.	When sewing starts, B/T sewing is operated with the button.	When sewing starts, B/T sewing is operated with the button.

Using the A, B buttons in the 4-digit displayer, the user can program the B/T number of stitches he/she wants.

[Caution]
Be aware that if the start B/T stitch is set to '0' in the 4-digit displayer, the start B/T sewing is impossible.

(4) Method of use: End B/T Button

This button is used when the user wants to prevent threads from loosening at the end of the sewing work. If the user presses this button in sequence, the location on the lights will change. This button offers the following three functions.

When sewing ends, B/T sewing does not operate.	When sewing ends, B/T sewing can be operated with the button.	When sewing ends, B/T sewing can be operated with the button.
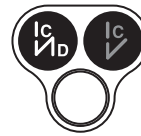
Using the C, D buttons in the 4-digit displayer, the user can program the B/T number of stitches he wants.

[Caution]
Be aware that if the end B/T stitch is set to '0' in the 4-digit displayer, the start B/T sewing is impossible.

(5) Method of Use: The Needle Plate Position Selection Button When the Sewing Machine Stops

When the user turns the power on, one of the up stop or down stop lights in the program unit panel needle plate is always left on. The user can change the stop location by pressing the button.

When machine stops while sewing, the needle plate makes an up stop.	When machine stops while sewing, the needle plate makes a down stop.

(6) Method of Use: The Presser Foot-lift Location Selection Button When the Sewing Machine Stops

When the user turns the power on, one of the up stop or down stop lights in the program unit panel pressser foot-lift is always left on. The user can change the stop location by pressing the button.

	When the machine stops while sewing, the presser foot-lift stops at the top.
	When the machine stops while sewing, the presser foot-lift stops at the bottom.

[Caution]
If the user uses the automatic up stop function of the presser foot-lift when the sewing machine stops while sewing, it may cause damage to it because it has been left up for an unnecessarily long time. Be aware that to prevent the foot-presser solenoid from being damaged, it is programmed to automatically come down when a certain amount of time passes.

(7) Method of Use: Automatic Thread Trimmer and Wiper Selection Buttons

These buttons offer the function of automatic trimming and wiping after sewing. By pressing these buttons in sequence, the user can use one of the following three functions. The light shows the function that is currently being used.

Automatic trimmer and wiper do not operate	Only automatic trimmer function is operate	Both automatic trimmer and wiper operate

(8) How to use product counter and bobbin counter

※Product and bobbin counters are functionalities available for Fortuna Series IV option type

① How to set product counter and bobbin counter
   A. Set/clear product counter and bobbin counter using the (COUNT) button in the program unit

Repeatedly press the ((COUNT)) button in the program unit to change the status of the lamp and functions as below.

① When product counter and bobbin counter are not used	○ (COUNT) <When the lamp is off>
② When product counter function is set	● (COUNT) <When the lamp is on>
③ When bobbin counter function is set	<When the lamp is flashing>
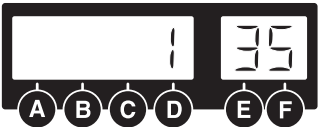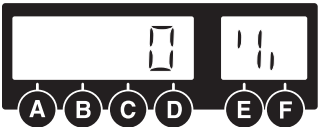
   ※ To use the counter function, set the detailed functions under parameter B-Group.

② How to use detailed functions of product counter and bobbin counter

A. How to use the detailed functions of product counter

To use the counter function, set the detailed functions beforehand.

---

① To use the product counter function, first set the value of the parameter B-35 (group B, item 35) as desired.

- 0: Set the external counter switch on
- 1: Set the automatic counter on after trimming

※ As the default value is set "0", the counter will not run if there is no external counter switch.

[Display: 1 35, buttons A B C D E F]

---

② Set the parameter B-36 to select the type of product counter

- 1: Up counter
- 0: Down Counter

※ The default value is set at "1".

[Display: 0 36, buttons A B C D E F]

---

③ Press the counter **F** button to set the counter function. Press the button to check and set the detailed data of the counter.

- Cn: The current counter amount
- rn: The remaining amount
- %: The progress
- tn: Total target amount (Default: 100)

※ Press **F** button repeatedly to see the above detailed data in order. The user may set up the current counter amount (Cn) and the total target amount (tn) as desired.

<The current amount>

[Display: 0 Cn, buttons A B C D E F]

<The remaining amount>

[Display: 100 rn, buttons A B C D E F]

---

④ After the total target amount is set, use B-37 and B-38 to set the movements.

<Set value of B-37>

- 0: When work is finished, the buzzer will go off and sewing may begin
- 1: When work is finished, the buzzer will go off and sewing may begin only when the (PROG) button is pressed
- 2: When work is finished, the buzzer will not go off and sewing may begin

< Set value of B-38>

- 0: No returning to automatic initial value when counting is complete
- 1: Returning to automatic initial value when counting is complete

<The progress>

[Display: 0 %, buttons A B C D E F]

<Total target amount>

[Display: 100 tn, buttons A B C D E F]

[Caution]

When B-38 is set at "0", the value will keep on going up/down even when counting is complete. The user will need to re-set the value of Cn to restart.

B. How to use the detailed functions of bobbin counter

Bobbin counter is designed to check the remaining amount of the lower thread.

    a. To use the counter, set detailed functions beforehand.

① To use the bobbin counter function, first set the value of the parameter **B-39** (Group B, item 39). • 0: Bobbin counter function not used • 1: Bobbin counter function used ※ The default value is set at "0". At this point, the bobbin counter will not start even when the counter button in the program unit is set at bobbin counter function.	

    b. Detailed functions of bobbin counter

① Select the bobbin counter function by pressing (COUNT) button to get the lamp flashing. Press **F** button and the display will change as shown in the right. "bc" stands for bobbin counter.	
② At this point, press **F** button to change the display to "UP". Press **F** button again to go back to the initial display of "3333 bt". Press **F** again to change to "bc" as explained in ①. The display will change by pressing **F** button.	3333 bt (A)(B)(C)(D) (E)(F)

• [bc]	Bobbin counter. The value will go down from the set value during sewing. (Initial value: 0, Set range: 0~9999, How to set: use **C** / **D** button)
• [UP]	This value will go up in proportion to the reduction ratio of "bc (bobbin counter)" Use this value to get the initial value of "bc (bobbin counter)" (Initial value: 0, Set range: 0~9999, Set manual increase/decrease function with C/D button)
• [bt]	Back-tack function that is shown in the initial display

[Caution]

※ Pay caution when using **A** button and (ENTER) button, designed to perform special functions for bobbin counter.

• **A** button (Clear/Preset) : Press **A** button when "bc" is shown on the display. Then the buzzer will go off and the current value will be stored as indicated, and will change to the value of bobbin counter.

• (ENTER) button (Store counter value) : Press (ENTER) button when "bc" or "UP" is shown on the display. The current indicated value will be stored as value of bobbin counter.

b. Detailed functions of bobbin counter

① When you start new sewing work, you must re-set the value of bobbin counter. Refer to the following if you do not know your re-set value. • First move to "UP" display and use **C** , **D** button to change the value to "0". • Replace old lower thread with the new one. The amount of the lower thread must be consistent. • Begin sewing. The more you sew, the higher the value of "UP" will be. • Continue sewing until you run out of the lower thread. • When there is no lower thread left during sewing, press (ENTER) button to store the counted value. • Before saving, subtract some 10~20 from the value in order to reflect the counted value after the lower thread ran out.	
② When the bobbin counter setting is complete, move to "bc" display. Then, you will see the value you stored on "UP" display.	
③ The value of "bc (bobbin count)" decreases gradually when sewing begins after completing set-up.	

[Caution]
※ Before using the bobbin counter function, move to "bc" display or initial display. If you start working from "UP" display, the value of counter will go up.

c. When bobbin counter is complete

① Replace old lower thread with the new one. Start sewing and the value of "bc (Bobbin counter)" will go down gradually.

② Take note that the buzzer will go off when the value goes down below 20. This is to warn that there is little lower thread left.

③ Continue sewing till the value of bobbin counter hits "0." Then sewing will stop, buzzer will go off, and the display will start to flash.

④ When sewing stops after counting is complete, use the following method to return.
  • Press (ENTER) to change to the automatically stored value of "bc."
 (AUTO CLEAR/PRESET)

[Caution]
※ To use the bobbin counter function, first set B-Group 39 to "1."
※ Use F button to change the display to set/clear the value of bobbin counter during sewing.
※ A button is used to set the value of bobbin counter on "bc" display or to return to the default value. Press A button to clear the current value and recall the stored counter value.
※ Wind the lower thread with consistency to ensure the proper use of bobbin counter functions. Counter functions may work differently depending on lower thread and sewing conditions.

(9) Method of Use: Sewing Material Edge Sensor Selection Button

A. Method of Use: Edge Sensor Function

After programming the edge sensing function in the sewing material from the parameter specific items, press the button. If the light goes on, you can start using the edje sensor function.	○ EDGE ⇒ ● EDGE
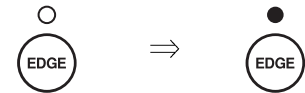
B. Method of Use of Sewing Material Edge Sensor's Specific Functions

The sewing material edge sensor selection button has a function that enables the machine to stop when it senses the end of a sewing material. If you want to operate a particular function, you must program a few specific items.

① User must change item A-40 programmed value according to the characteristic of the installed sensor.
  • 0: When edge sensing, 5V output (Active High) should be the initial value
  • 1: When edge sensing, 0V output (Active Low)

```
    0  40
A  B  C  D   E  F
```

② After sensing, you can set up the movement to item A-41, A-42.
  <Item A-41: the number of stitches it will sew after it senses the edge>
    • 0~225: after sensing, the machine will sew as many stitches as it has been programmed to sew.
  <Item A-42: the sewing speed after it senses the edge of material>
    • 20~2000RPM: this item sets up the speed of the stitches set to be sewn after it senses the edge.

```
    3  41
A  B  C  D   E  F
```

```
 1000  42
A  B  C  D   E  F
```

③ After sensing the edge of sewing material and the machine has sewn the number of stitches at the programmed speed, the user needs to select item A-43 to change the operation.
  • 0 : to stop after sewing the programmed stitch numbers.
  • 1 : to operate automatic thread trimming function after sewing the programmed stitch numbers.

```
    0  43
A  B  C  D   E  F
```
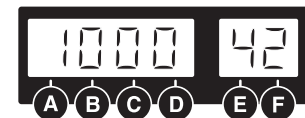
(10) Method of Use: Pattern Work Selection Button
A. Method to Set Up the Pattern Work Function

This function is used when you need to continuously work on a sewing material. If the light goes on after pressing the button, you can use the pattern sewing function.	○ (PATTERN)　⇒　● (PATTERN)
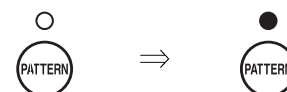
B. Method of Use of Pattern Sewing Specific Functions

① Cautionary words when using the pattern function
- Before using the pattern function, finish the trimming work and turn on the pattern switch light.
- If the user presses the pattern switch twice when he/she is not using the pattern function, the light will go off and he/she will be able to go back to normal sewing. However, if the pattern mode has not been completely finished, the pattern light will not go off.
- The pattern function sewing speed will be the programmed speed.
- The value set in each pattern mode is not erased when the power is turned off. Therefore, if you want to use the same pattern again, press the same mode again to use it. However, if the program is initialized, all the formerly programmed information will be erased and the user must reset the information again.

② Method of use: (PATTERN) function
ⓐ first press the (PATTERN) button and select the pattern sewing function.
ⓑ Select the pattern you want and the light will go on the pattern you selected.
ⓒ If you press the (PROG) button, the screen will change and you can use the stitches of each side of the pattern you chose to program the value.
< Method to program the value of each pattern side >
- Method by using the Ⓒ , Ⓓ buttons
  – Inputting directly the number of stitch the user wants by using the buttons C and D. This method is used when the user already knows the length of the stitches he/she is choosing.
- Method using the pedal movement
  – This is a function used when the user does not know the stitch length and sews directly to check the number of stitches for the pattern he/she wishes to program. If the user presses on the pedal after the programming screen comes on, the pedal can program the number of stitches by using the accelerating and decelerating characteristics through the pedal's sensors. The standard for choosing the number of stitches here is slower than the normal sewing speed and the programmed pattern sewing speed.
- Method using the A button and 1/2 stitch button
  – This function is used when the user needs to make small adjustments at the end of the pattern work. It allows the user to check and program the pattern length while he/she sews at a slow speed or sews half stitches.

<Screen showing thef programming of stitch numbers for each side>

P 　　0　　01
Ⓐ Ⓑ Ⓒ Ⓓ 　 Ⓔ Ⓕ

A 　　0　　01
Ⓐ Ⓑ Ⓒ Ⓓ 　 Ⓔ Ⓕ
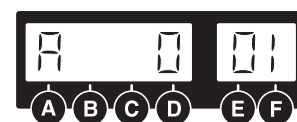
P : When the AUTO light is off, the machine stops when the pedal is released while sewing.
A : When the AUTO light is on, the machine will finish sewing the pattern section even if user releases pedal while sewing.
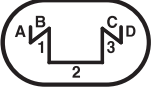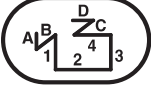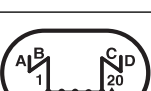
ⓓ After programming is finished, press the (ENTER) button and save the set up value. Then press the (PROG) button. After the stitch numbers of each side disappear from the screen, you can start sewing with the programmed value in the pattern sewing function.
ⓔ The pattern sewing speed is constant because it sews at a programmed speed not by the acceleration or deceleration of the pedal. If you press the pedal after pressing the (AUTO) button and see the light blink, sewing will continue until it is finished even if you release the pedal.

[Caution]
- After setting each side of the stitches, the user must press the (ENTER) button to save the programmed value.
- When the pattern has more than one side, the pattern work only operates for the number of stitches programmed for each side.

③ Specific items of each pattern

	A convenient pattern for straight sewing at constant speed for a definite length. The sides can be set from 0 to 999 stitches.
	A convenient pattern for repetitive 3-sided sewing. Each side can be set from 0 to 999 stitches.
	A convenient pattern for 4-sided sewing. Each side can be set from 0 to 999 stitches. (Used often in square sewing)
	A convenient pattern when forward/backward sewing is needed continually. forward/backward sewing is possible 9 times. Also each side can be set from 0 to 999 stitches. (This pattern is used for continuous work on back tags of leather belt rings).
	A convenient pattern when the user wants to make many-sided patterns. The user can make patterns of up to 20 sides. Each side can be set from 0~999 stitches.

④ Method of Use：Chain function (pattern linking function)
- First press the (PATTERN) button and select the pattern sewing function
- Next, press the (CHAIN) button.
- If you press the (PROG) button, the screen will change as the figure shows on the right. You can change the number of chains with buttons **E**, **F**.
- If you want to program the number of chains in the pattern you want, use buttons and, to go to the item you want and press the pattern button.
- After programming the chain numbers as explained above, press the (ENTER) button and the change of value will be saved. Then press the (PROG) button to come out from the chain programming screen.
- If you operate the programmed sewing work, the pattern with the blinking light is the current work being done and the pattern with the light on continuously is the next programmed pattern.

[Caution]
- After programming the chain function and pressing the (ENTER) button, the set up value is saved.
- If you change the pattern program while sewing, it will sew with the new programmed pattern.
- If the last chain pattern is finished, it will automatically go to the first sewing pattern.

※If the user presses the when using the pattern sewing function, the (AUTO) light will go on and the machine will automatically sew the programmed pattern section even if the user releases the pedal.

(11) Method of Use: Constant Speed Sewing (AUTO) Selection Button

This button is used to choose the sewing speed. It offers two functions according to where the light turns on.

● AUTO	• When the light is blinking - If the user presses on the pedal, the machine will sew at the programmed sewing speed.	○ AUTO	• When the light is off - The machine will sew according to the amount of pressure given to the pedal by the user.

[Caution]
This button works in a different way when using the pattern function. Please refer to section 10).

(12) Method of Use: Sewing Speed Program Changing Button
A. Method to Check Sewing Speed

If you want to check the current programmed sewing speed, you must press the ⬆SPEED⬇ button. If you briefly press the ⬆ button ⬇ button once, the screen shown on your right will appear briefly and then return to the initial screen.
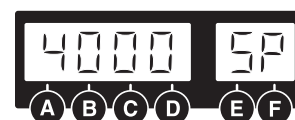
※ The speed on the screen is the limit of the maximum sewing speed.

`4000` `5P`
Ⓐ Ⓑ Ⓒ Ⓓ   Ⓔ Ⓕ

[Caution]
The maximum speed and minimum speed limits can be changed by changing the parameter's specific items.

B. Sewing Speed Changing Method

① When you want to change the sewing speed, you can see the screen that shows the current sewing speed by pressing the ⬆ button or ⬇ button.

② If you see the current speed on the screen, you can change the speed by using the ⬆ and ⬇ button before going back to the initial screen.
 • When you press the buttons twice in sequence: The sewing speed increases/decreases by 40RPM.
 • When you keep pressing the button: The sewing speed increases/decreases rapidly.

`3333` `bt`
Ⓐ Ⓑ Ⓒ Ⓓ   Ⓔ Ⓕ

`4000` `5P`
Ⓐ Ⓑ Ⓒ Ⓓ   Ⓔ Ⓕ

`3000` `5P`
Ⓐ Ⓑ Ⓒ Ⓓ   Ⓔ Ⓕ
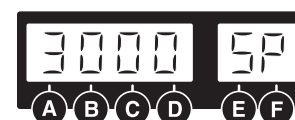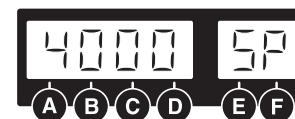
[Caution]
-Be aware that if you don't press the ⬆ or ⬇ button, the screen will automatically go back to the initial screen.
-The maximum speed and minimum speed limits can be changed by changing the parameter's specific items.

3) Start and End Backtack Stitch Correction Method
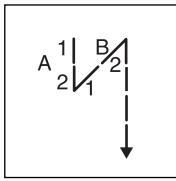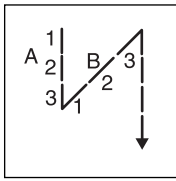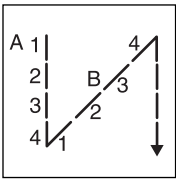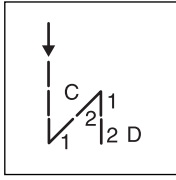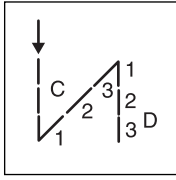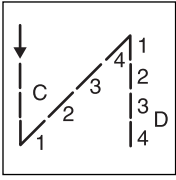
※ Since backtack stitches may vary according to the type of sewing machine, use the following stitch correction method.

※ To adjust the stitch fast and clean, users should check the stitch condition before commencing the correction.
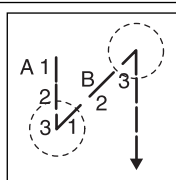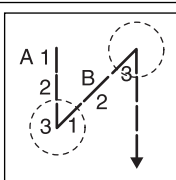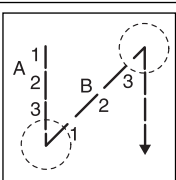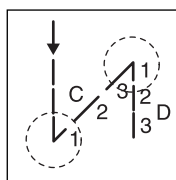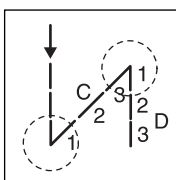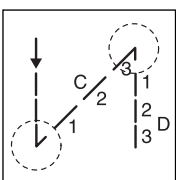
① Classification according to backtack sewing condition

※ The backtack sewing condition can be classified as follows (When A: 3 stitches, B: 3 stitches, C: 3 stitches, D: 3 stitches)

A. When one more or less stitch than the set stitch number is sewn

Classification	Sewing condition where few backtack stitches are sewn	Correct backtack sewing condition	Sewing condition where more backtack stitches are sewn
Start backtack Sewing condition	When sides A and B each have one less stitch sewn	When sides A and B each have 3 stitches correctly sewn	When sides A and B each have one more stitch sewn
End backtack Sewing condition	When sides C and D each have one less stitch sewn	When sides C and D each have 3 stitches correctly sewn	When sides C and D each have one more stitch sewn

B. When one more or one less stitch is sewn than the programmed stitch number

Classification	B/T condition where the stitch length comes out shorter	Correct B/T sewing condition	
Start backtack Sewing condition	When the length of the last three stitches in sides A and B have been sewn short.	When sides A and B have 3 stitches correctly sewn.	When sides A and B each have 3 stitches and a half stitch (or less than one stitch) sewn
End backtack Sewing condition	When the length of the first stitch in sides C and D have been sewn short.	When the sides of C and D have 3 stitches correctly sewn	When the sides of C and D each have 3 stitches and a half stitch (or less than one stitch) sewn.

[Caution]
The figures above show each representative sewing condition. And there may be some differences according to the conditions of the sewing machine and it is normal that two types of conditions occur at the same time.

② Start/End B/T stitch number correction method
　　※ The method to correct B/T stitch numbers may differ according to the user. However it is basically done in the following order.

　　　　A. When the machine sews one less or one more stitch than the programmed number of stitches.

<Initial screen>

ⓐ First, fully check the B/T sewing condition 　: Commence sewing and check the current sewing condition. Refer to the figure above.	[display: 3333 / bt] A B C D E F

ⓑ If you have checked the sewing condition, first correct the stitch number that differs by one or more stitches to the programmed stitch number.
　　※ Correction method for stitch numbers with more than one stitch difference
　　• Program range: -6 stitches ~ 6 stitches
　　• Program unit: 1 stitch
　　• Method to apply correct stitch number (program using buttons A, B, C and D).

Side A programmed value	3(programmed stitch number) + (3-actual stitch number sewn on side A)
Side B programmed value	3(programmed stitch number) + (3-actual stitch number sewn on side B)
Side C programmed value	3(programmed stitch number) + (3-actual stitch number sewn on side C)
Side D programmed value	3(programmed stitch number) + (3-actual stitch number sewn on side D)

　　• After programming, press the (PROG) and (🔩) buttons simultaneously.
　Ex) When there is one less Start or End B/T stitch sewn.
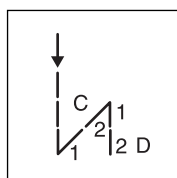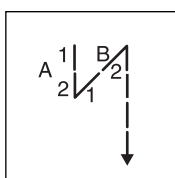
a In the initial screen use buttons Ⓐ , Ⓑ , Ⓒ , Ⓓ to change it from "3 3 3 3" to "4 4 4 4."
b After programming it to "4 4 4 4" press the (PROG) button. Then press the 1/2 stitch (🔩) button. 　You will see the letters "bt-C" and the buzzer will ring three times and the screen will automatically 　return to the initial screen.
c The changed initial screen will continue to display the wanted B/T programmed value of "3 3 3 3."
d Recommence sewing and check the corrected stitch number
e If the corrected sewing condition continues to show more than one stitch difference, repeat steps 　(a~d) and make corrections.

　※ The example above is an explanation of when one B/T stitch number comes less than one
　※ When there is more than one stitch is added or missing, you can correct the stitch number as explained above.

[display: 3333 / bt]
A B C D   E F
↓
[display: 4444 / bt]
A B C D   E F
↓
[display: bt_C /]
A B C D   E F
↓
[display: 3333 / bt]
A B C D   E F

[Caution]
※ The stitch number correction value program range is between -6 stitches to 6 stitches. You cannot see the currently applied correction value on the initial screen. If you want to see the currently applied correction value, press the (PROG) button and then the (AUTO) button and either check the programmed value of each side or check items 30(side A's correction value), 31(side B's correction value), 32(side C's correction value) and 33(side D's correction value) from Group B of the parameter.
※ If each side's corrected value has been corrected to the minimum or maximum value limit (between -6 stitches to 6 stitches) and the sewing condition is still not correct, reduce the B/T sewing speed.
※ Generally, you can correct in the manner mentioned above when there is more than one stitch difference. And you can correct when there is less than one stitch difference with the item mentioned in the next page.

B. When the machine sews less than a stitch more or less than the one programmed.

<Initial screen>

ⓐ If there are still problems with the B/T sewing condition even after correcting the stitch numbers for more than one stitch difference based on item "A," refer to figure ①-B and check the sewing condition again.

ⓑ Look at the sewing condition and make the correction as follows:
   ※ Program range for making stitch corrections for less than one stitch:(Prog+Auto)
      • -6 stitches ~ 6 stitches
      • Program unit: 0.05 stitches (Corrections are done by dividing one stitch into 20 parts).
      • Initial program: A(00.30), B(00.30), C(00.40), D(00.40)
      • Correct stitch number application method (use C and D buttons for programming).
   ※ **When the stitch length comes out short(the third stitch of sides A and B/ the 1st stitch of sides C and D)**

<When the stitch length comes out short>

<When the stitch length is less than one stitch>

Side A program value	⬛⬛ ⬛⬛ (Currently programmed corrected value)
	+ (01.00-the length of the 3rd stitch sewn in side A)
Side B program value	⬛⬛ ⬛⬛ (Currently programmed corrected value)
	+ (01.00-the length of the 3rd stitch sewn in side B)
Side C program value	⬛⬛ ⬛⬛ (Currently programmed corrected value)
	+ (01.00-the length of the 1st stitch sewn in side C)
Side D program value	⬛⬛ ⬛⬛ (Currently programmed corrected value)
	+ (01.00-the length of the 1st stitch sewn in side D)

   ※ **<When the stitch comes out less than one stitch longer> (the last stitch of sides A and B/ and the first stitch of sides C and D)**

Side A program value	⬛⬛ ⬛⬛ (currently programmed correction value)
	- the length of the extra part of the stitch sewn on side A
Side B program value	⬛⬛ ⬛⬛ (currently programmed correction value)
	- the length of the extra part of the stitch sewn on side B
Side C program value	⬛⬛ ⬛⬛ (currently programmed correction value)
	- the length of the extra part of the stitch sewn on side C
Side D program value	⬛⬛ ⬛⬛ (currently programmed correction value)
	- the length of the extra part of the stitch sewn on side D

   [Caution] • The shadowed part is the currently saved correct value.
             • After programming, press the (ENTER) button and save the programmed value.

   Ex) When the Start/End B/T stitch length is shorter than the programmed stitch length (by around half a stitch).

a. In the initial screen, press the (PROG) button and then also press the (AUTO) button.
b. The screen will then go to the stitch number correction screen. Using the 🅴 , 🅵 buttons you can change the length of each side (A,B,C and D) in this screen.
c. If you have finished programming the new correction values to sidesA, B, C and D, press the (ENTER) button and save the corrected value. If you press the (PROG) button, you will return to the initial screen. (A:00.30, B:00.30, C:00.40, D:00.40) → (A:00.50, B:00.50, C:00.75, D:00.75)
d. Commence sewing and check the B/T sewing condition.
e. If the corrected sewing condition still shows differences between the programmed value, the repeat steps (a~d) and continue correction.
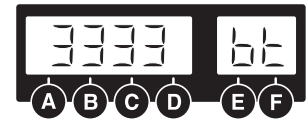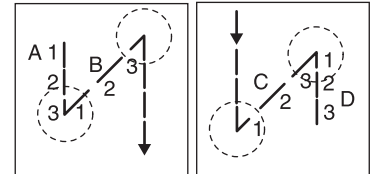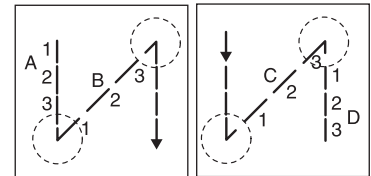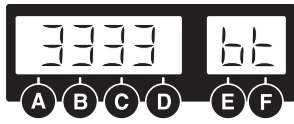
[Caution]
   ※ If each side's corrected value has been corrected to the minimum or maximum value limit (between -6 stitches to 6 stitches) and the sewing condition is still not correct, reduce the B/T sewing speed.
   ※ Generally, you can correct for when there is more than one stitch difference with item A. However, with item B, you can correct when there is either more or less than one stitch difference.
   ※ Make sure to press the (ENTER) button and save the programmed value when you finish programming sides A, B, C and D's new correction value.

4) Method of Use: Inertia Tuning Function

① The inertia tuning function enables the machine to save the gain value of the motor that matches the loaded inertia. If you simultaneously press buttons (PROG) and (ENTER), you will see the inertia tuning screen. Then, you will see the words "TUNE" blinking.	<Inertia tuning initial screen> ᵗᵁⁿᴱ ⒶⒷⒸⒹ ⒺⒻ
② When the screen changes, you must press the pedal until the buzzer rings. If you release the pedal before the buzzer rings the inertia tuning won't be completed. Therefore, you must press on the pedal until the buzzer rings. (When doing inertia tuning, the sewing machine will operate and stop 10 times).	<Initial screen> 3333 ᵇᵗ ⒶⒷⒸⒹ ⒺⒻ
③ When inertia tuning is completed, the buzzer will ring and it will automatically return to the initial screen.	

[Caution]
Inertia tuning can only be carried out when the controller is attached to the sewing machine for the first time and when the sewing machine does not accelerate or decelerate quickly.

5) Sewing machine head open error and safety switch error

① Sewing machine head open error function is available for KM-2300 series. When the sewing machine head is lifted during sewing or with the power switch on, "oPEn Er" will show with a buzzer sound and sewing will stop.

Description	Symptoms and troubleshooting
① When the machine head is lifted with the power switch on	• "oPEn Er" will appear. • The error indication will disappear when the machine head is put back to its original position, and sewing may begin.
② When the machine head is lifted during sewing	• "oPEn Er" will appear. • If the error message remains even after putting the machine head to its original position, turn the power off first and turn it back on to continue sewing.
③ When the machine head is in its original position	• When "oPEn Er" message appears even when the machine head is in its original position, be sure to check the following. - Check the switch attached under the right side of the machine head - Check the set value of parameter　C-61 　: In case of KM-2300 Series and KM-1750/1790 Series, the value set for No.　C-61　shall be "20" and "120" respectively.

② Safety switch error function is available for SC-7300 series. The error message will show when the blade does not return to its original position during trimming

Description	Symptoms and troubleshooting
① When the error appears during sewing	• "SF22 Er" will appear. • Check if the blade of the sewing machine has returned to its original position.
② When the error appears immediately after sewing starts after turning the power on	• If "SF22 Er" message appears after you turn the power on and begin sewing, be sure to check the following. 　- Check the safety switch attached on the back of the sewing machine 　- Check the set value of parameter: The value of　C-61　must be set at "111."

6) How to Use the Edge Sensor (Fabric Edge Sensor)

A. Applicable Fortuna Model

① Fortuna Series 3 : Full Function Type (using the switch and lamp connector port)
② Fortuna Series 4 : Full Option Type (using the switch and lamp connector port)

B. Installation

① Install the edge sensor bracket on the head of the sewing machine as in the figures below.

② Attach the edge sensor to the installed edge sensor bracket.

EDGE SENSOR

Upside of sewing machine table
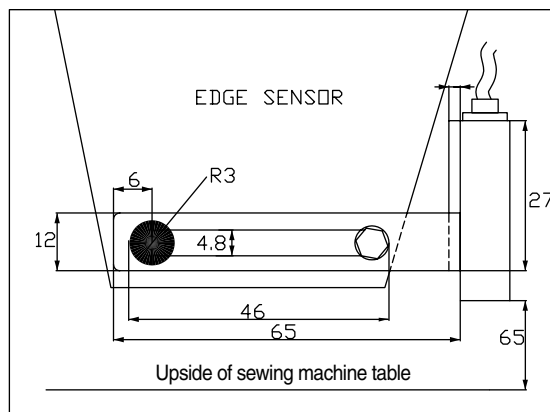
< KM-235,250 >
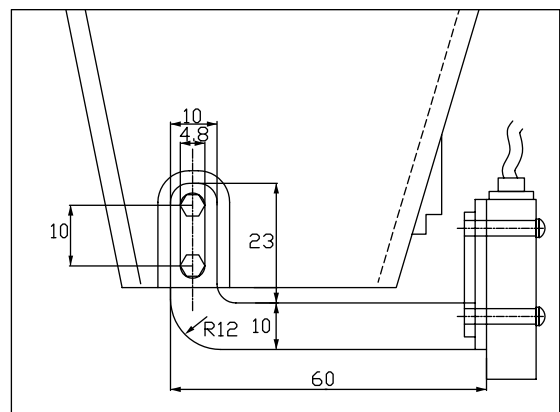
< KM-750,790 >

③ Install the edge sensor box (ass'y), which is connected to the edge sensor, on the table.

④ Link the edge sensor connector to the switch and lamp (or option 1) connector.
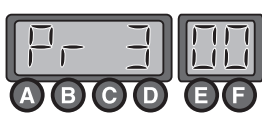
[Pin Number]

14	13	12	11	10	9	8
7	6	5	4	3	2	1
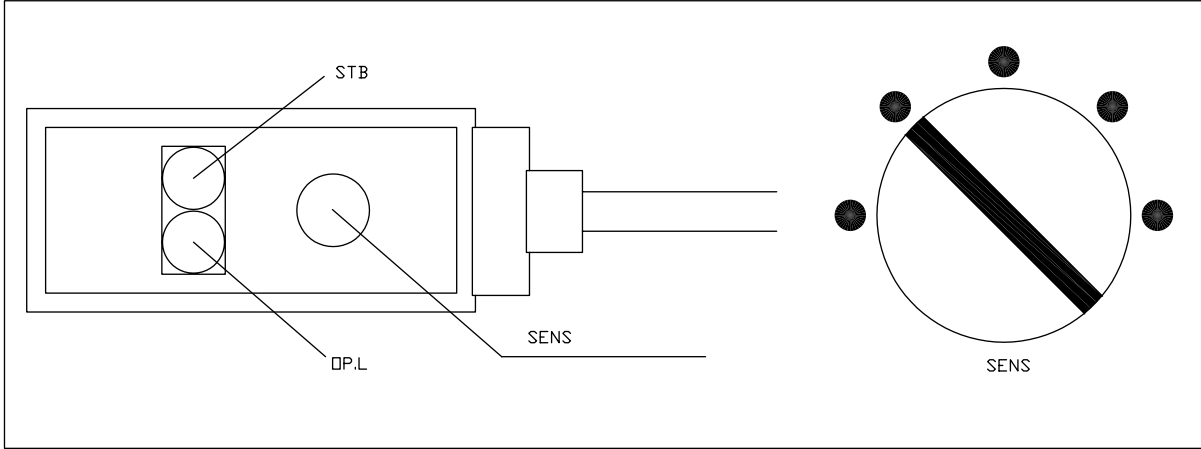
1, 2, 7 : GND	9 : 4/4
3 : Left switch LED	10 : 3/4
4 : Right switch LED	11 : 2/4
5 : Left switch	12 : 1/4
6 : Right switch	13 : Switch-CNT
8 : VCC (5[V])	14 : Switch-HALF

< Fortuna Series 4 >

C. Edge Sensor Program Setting

① Turn the power on while pressing (Prog) simultaneously. "PrEn" is displayed with a "beep" sound and then disappears.	PrEn A B C D E F
② Programs should be modified after trimming is completed.	
③ Press (Prog) first, and then press ⓒ simultaneously. Then the program modification mode appears as shown in the right figure.	Pr 3 00 A B C D E F
④ Use Ⓔ, Ⓕ to set the code number at 52. Use ⓒ, Ⓓ to change the value from 2, the default value, to 12 and then press (Enter) to save the new value.	
⑤ When the program setting is done, press (Prog) to turn off the blinking lamp and use the sewing machine.	

D. Edge Sensor Setting

① First make sure that there is no fabric below the sensor, and set the operating mode of the rear side of the sensor at L.ON.

② Press (Edge) on the P/U and check if the LED is blinking.

③ Check if the STB (yellow) LED is turned on, when there is a fabric below the sensor.

④ If the STB (yellow) LED is not turned on, switch the operating mode to Operating D.ON and begin the setting (depending on types of fabric).

⑤ Adjust the volume of SENS to make OPL (red) turned off while fabric is below the sensor, and make OPL (red) turned on when it is removed (it doesn't matter whether the STB LED is turned on or not).

⑥ Check whether a signal alarm is issued in line with the presence of fabric under the sensor.

E. Use of the Edge Sensor

① Press ⟨Edge⟩ to turn on the lamp.	
② During sewing while the lamp is on, if the sewing needle comes near to the edge of fabric (some 2cm between the needle and the edge of fabric), a "beep" sound is issued and the sewing stops.	
③ Move the pedal to the neutral position and press it again. Then the sewing is resumed according to the number of stitches previously set under Prog Group "A" on the P/U (the number of stitches to be made after sensing the fabric edge) and the sewing speed previously set under No. 42.	

[Note]
The default number of stitches to be made after edge sensing is three stitches and can be adjusted to 64 stitches at the maximum depending on user choice. The sewing speed can be set at the range of 24 to 2040spm.
The default speed is 200spm. If the pedal is pressed continuously, the sewing machine will repeat the same function as described above.

④ When a trimming is programmed to be conducted after the low-speed sewing is completed, the backtack sewing will be performed according to the number of backtack stitches defined on the P/U, followed by trimming.	

F. Edge Sensor Deactivation

① Press ⟨Edge⟩ to turn off the edge sensor. Then the edge sensor is deactivated.

G. Edge Sensor Program Modification

① Programs should be modified only after trimming is conducted.

② Press (Prog)° first, and then press Ⓐ simultaneously.
Then the program modification mode is displayed as shown in the right figure.

③ Use Ⓔ, Ⓕ to enter the code number to be modified, and use Ⓒ, Ⓓ to enter the desired value.
Press (Enter) to save the new value.

④ When the modification is completed, press (Prog)° to turn off the blinking lamp and then use the sewing machine.

[Caution]
When the machine is initialized, all data are restored to default values given when it is shipped out from the factory.

⑤ The edge sensor-related programs are located in Group A, and the code numbers and descriptions are displayed as below.

Group	Code #	Scope	Stage	Description	Remarks
A	40	0/1		Select types of fabric sensor	
	41	0 ~ 64	1 stitch	Set the number of stitches to be made after sensing the fabric edge	
	42	24 ~ MAX, SPM	40 spm	Set the speed of sewing after sensing the fabric edge	
※ When using patterns, trimming is automatically conducted after the set number of stitches is made.					

7) Motor Controller Setting

(1) Controller Setting by Machine Type

Classification	Machine Type	Set Value for Parameter B-56 Model	Remarks
1	SC-7300 Series	88	Parameters are set according to the ordered specifications before machine's shipment from the factory.
2	SC-7500 Series	124	
3	SC-7310 Series	125	

※ Model Number Setting

Program Enable		Initial Screen		Parameter B Group		Move to B-56
"POWER ON "+ (Prog)	⇨		⇨	(Prog) + B	⇨	E or F
PrEn		3333		Pr 2 00		88 56

	Select the Model Desired		Save
⇨	C or D	⇨	(Enter)
	124 56		124 56
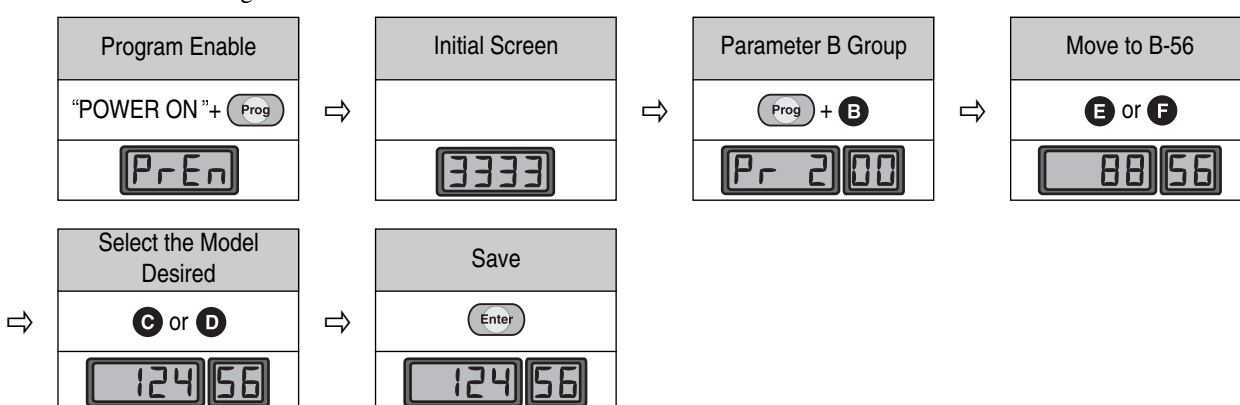
[Note]
① Before the product is shipped out from the factory, all settings are completed in line with the machine type ordered.
② In case where the controller which is different from the ordered specifications is installed to the chain-type machine:
    ⇨ Set the value of parameter B-56 according to the concerned machine type.
    ⇨ Depending on the program version of controller, it may not be applicable to some machines. See the following to make the proper setting according to the machine type.

※ Version display
▶ When the power is turned on, the CPU version is displayed as below on P/U for a moment, and then the screen moves to the initial screen ("3333").

Classification	Fortuna Series III(CPU version 11)	Fortuna Series IV(CPU version 11)
Program Unit (P/U)	SEr3 11	SEr4 07
Handy Controller	SEr3 ⇨ 11	SEr4 ⇨ 07

▶ This is an old version where the CPU version is not displayed.

(2) In case where the top thread trimming device is installed

Make a setting based on the check points below to ensure proper operation of the top thread trimming device when the top thread trimming device is installed.

① Make the setting as below depending on the program version of the controller.

Program version		Setting
1	S-III version "11" or above	Set the value of Parameter A-73 at "1"
	S-IV version "7" or above	
2	Lower than S-III version "11"	Modify the trimming sequence of Parameter B-55.
	Lower than S-IV version "7"	

② Modification of the sequence of Parameter B-55
   ▶ Using the external program unit

	Initial Screen	Parameter B Group	Move to B-55
"POWER ON"+ (Prog) ⇨	⇨	(Prog) + **B** ⇨	**E** 또는 **F**
`PrEn`	`3333`	`Pr 2 00`	`5E9 55`

Sequence Start	T/T Sol. "ON"	Lapsed Time: Unit-1[ms]	80[ms]
⇨ (Enter) ⇨	**E** ⇨	**E** ⇨	**E**
`--80 01`	`--83 02`	`--b0 03`	`80 04`

T/T Sol. "OFF"	Lapsed Time: Unit-1[ms]	66[ms]	W/P Sol. "ON"
⇨ **E** ⇨	**E** ⇨	**E** ⇨	**E**
`--9A 05`	`--b0 06`	`66 07`	`--84 08`

Lapsed Time: Unit-1[ms]	0[ms]	W/P Sol. "OFF"	Sequence End
⇨ **E** ⇨	**E** ⇨	**E** ⇨	**E**
`--b0 09`	`0 10`	`--96 11`	`--00 12`

Sequence Save
⇨ (Enter)
`5E9 55`

※ Use **C** and **D** buttons when changing the value of sequence.
※ Use **E** and **F** buttons to move to the next sequence.

▶ How to use the imbedded handy controller

Program Start		Group B		B-55		Sequence
(Prog) + Ⓐ	⇨	Ⓑ	⇨	Ⓐ	⇨	Ⓒ
PrEn		b-01		b-55		SE9

	Sequence Start		T/T Sol. "ON"		Lapsed Time: Unit-1[ms]		80[ms]
⇨	Ⓒ	⇨	Ⓒ	⇨	Ⓒ	⇨	Ⓒ
	--80		--83		--b0		80

	T/T Sol. "OFF"		Lapsed Time: Unit-1[ms]		66[ms]		W/P Sol. "ON"
⇨	Ⓒ	⇨	Ⓒ	⇨	Ⓒ	⇨	Ⓒ
	--9A		--b0		66		--84

	Lapsed Time: Unit-1[ms]		W/P Sol. "OFF"		Sequence End		0 [ms]
⇨	Ⓒ	⇨	Ⓒ	⇨	Ⓒ	⇨	Ⓒ
	--b0		--96		--00		0

	Sequence Save		Group B
⇨	Ⓔ	⇨	Ⓔ
	SE9		b-55

※ Use Ⓐ and Ⓑ buttons when changing the value of sequence.
※ Use Ⓒ and Ⓓ buttons to move to the next sequence.
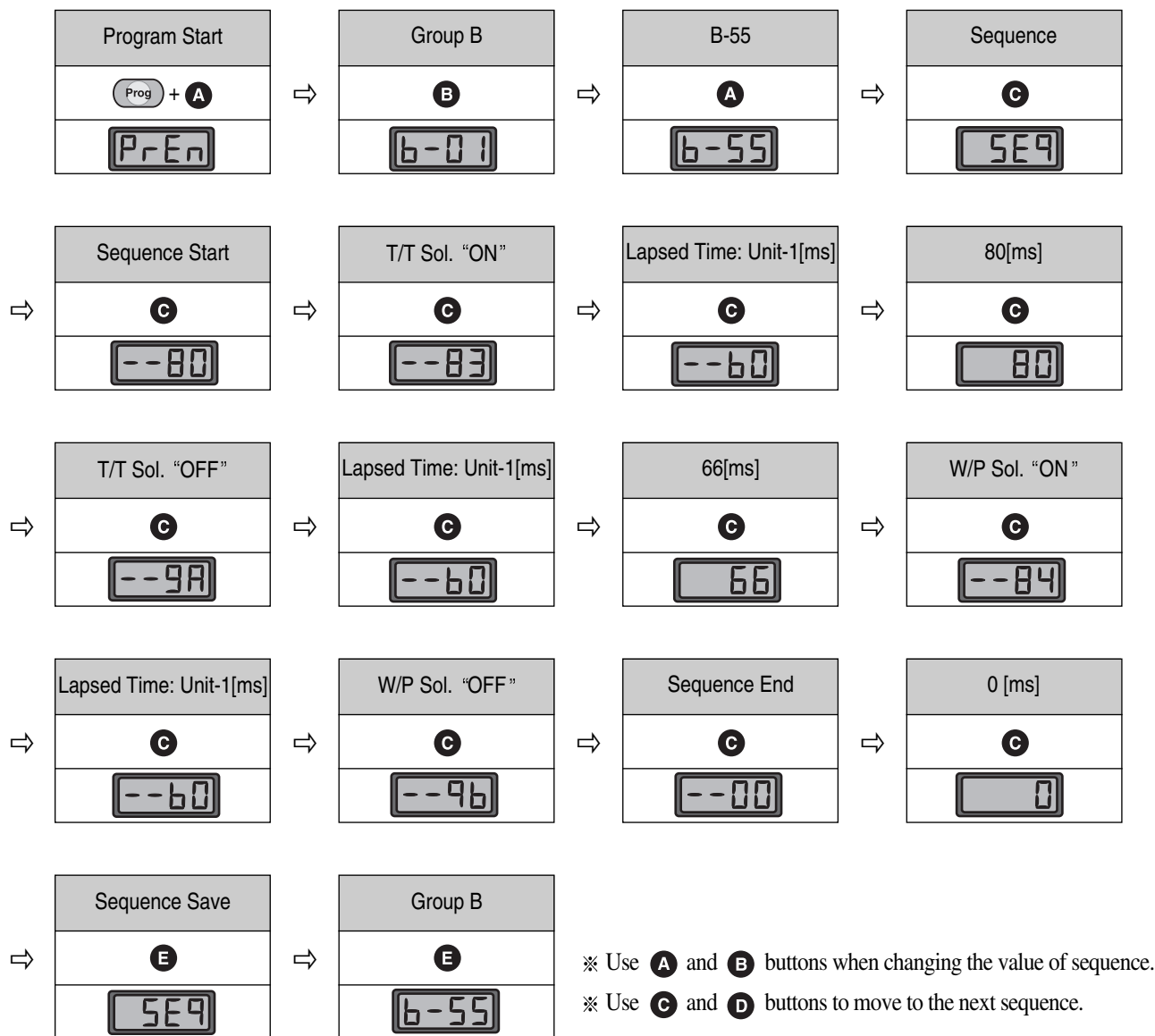
[Note]
When modifying the sequence by using the handy controller, the change in the sequence number is not displayed, so more care should be exercised in conducting the modification.

(3) Trimming Sequence of Chain-type Machine

When installing the controller which has an older program version, see the following and correct the trimming sequence.

Work Flow	Program Code				

Work Flow
Start of Sequence
↓
T/T Solenoid "ON"
↓
Wait for 80[ms]
↓
T/T Solenoid "OFF"
↓
Wait for 66[ms]
↓
W/P Solenoid "ON"
↓
Wait for 1[s]
↓
W/P Solenoid "OFF"
↓
End of Sequence

Program Code

Number	Command	Data Part			Explanation
		1st	2nd	3nd	
01	--80				Sequence Start
02	--83				T/T Solenoid "ON"
03	--B0				80[ms] of Time Lapse
04		80			
05	--9A				T/T Solenoid "OFF"
06	--B0				66[ms] of Time Lapse
07		66			
08	--84				W/P Solenoid "ON"
09	--B3				1[s] of Time Lapse
10		10			
11	--9B				W/P Solenoid "OFF"
12	--00				Trimming Sequence End
⋮	--00				
64	--00				Sequence Close

[Note]

⇨ When installing the top thread trimming device, change the trimming sequence value in No. 09 from B3 to B0 and the value in No. 10 to "0".

⇨ If the program version is S-III("11") and S-IV("7") or above, set the value of A-73 at "1".

9

SIMPLE OPERATION UNIT PART NAMES AND METHOD OF USE

1) Names of Each Part in the Simple Operation Unit

※ Simple operation unit is attached in the front of the control box and used when there is no program unit panel.

- 4-Digit Displayer
- Start B/T Programming Displayer → A
- End B/T Programming Displayer → B
- Needle Plate Up Stop and Down Stop Programming Displayer → C
- Presser Foot-lift Up Stop and Down Stop Programming Displayer → D
- Thread Trimming and Wiper Programming Displayer → E/Prg
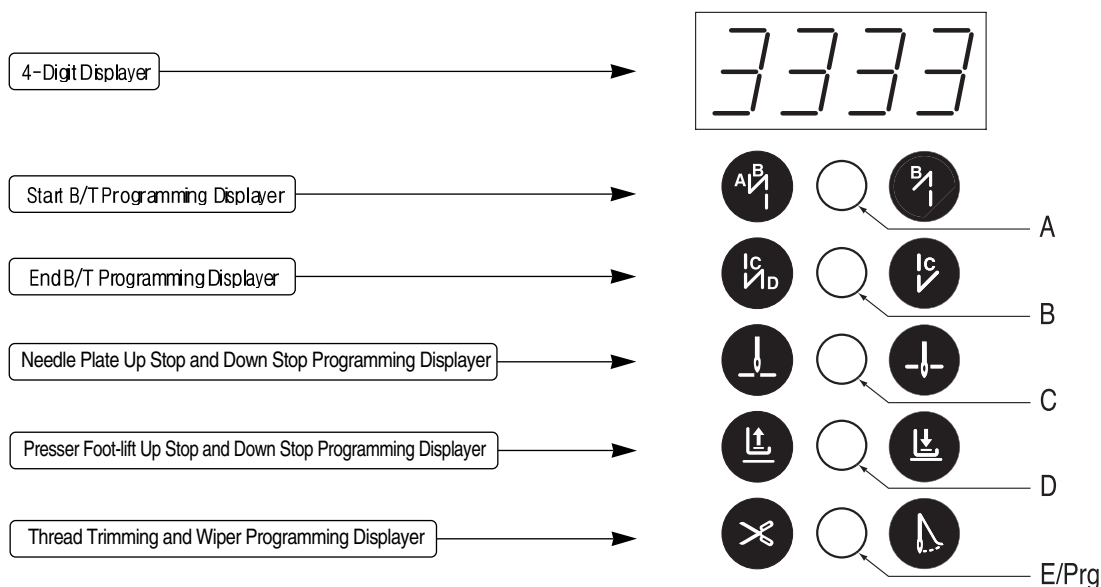
2) Simple Program Unit Method of Use

(1) Initializing

This function is used when the user randomly corrects the programmed value and forgets the initial programmed value.
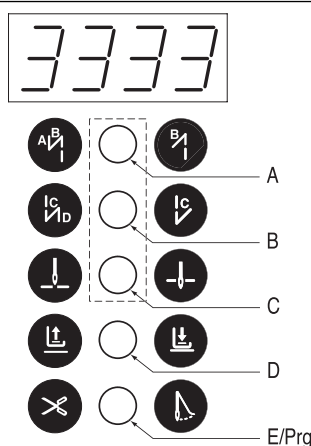
Turn the power on by simultaneously pressing the buttons , A and B, C.

[Caution]
- When you initialize, you change all the original values that the sewing machine had when it was manufactured in the factory. Initialize only when absolutely necessary.
- When initializing, you must run the motor for more than 5 seconds at the speed of 1000RPM in order to make the synchronizer to work properly.

(2) Programming the Start B/T Sewing Conditions with Button A

This button is used when the user wants to prevent threads from loosening at the end of the sewing work. If the user presses this button in sequence, the location on the lights will change as shown in the figures below. This button offers the following three functions.

When sewing starts, B/T sewing does not operate.	When sewing starts, B/T sewing can be done with the ⬇ button.	When sewing starts, B/T sewing can be done with the ⬇ button.

Use the A, B button to program the number of B/T stitches in the 4-digit displayer.

[Caution]
Be aware that if the end B/T stitch number is set to '0' in the 4-digit displayer, the user will be unable to operate start B/T sewing.

(3) Programming the Start B/T Sewing Conditions with Button B

This button is used when the user wants to prevent threads from loosening at the end of the sewing work. If the user presses this button in sequence, the location on the lights will change as shown in the figures below. This button offers the following three functions.

When sewing starts, B/T sewing does not operate.	When sewing starts, B/T sewing can be operated with the ⬇ button.	When sewing starts, B/T sewing can be operated with the ⬇ button.

Use the C, D button to program the number of B/T stitches in the 4-digit displayer.

[Caution]
Be aware that if the end B/T stitch number is set to '0' in the 4-digit displayer, the user will be unable to carry out start B/T sewing.

(4) Programming the Needle Plate Position when Sewing Stops with Button C

When you turn the power on, one of needle plate's up stop and down stop lights in the simple operation unit will always be on. If you press the button you can select the stopping location.

If the machine stops while sewing, the needle plate makes an up stop.	If the machine stops while sewing, the needle plate makes a down stop.

(5) Programming the Presser Foot-lift Location when Sewing Stops with the Button D

When you turn the power on, one of presser foot-lift's up stop and down stop lights in the simple operation unit will always be on. If you press the button you can select the stopping location.

	If the machine stops while sewing, the presser foot-lift makes an up stop.			If the machine stops while sewing, the presser foot-lift makes a down stop.
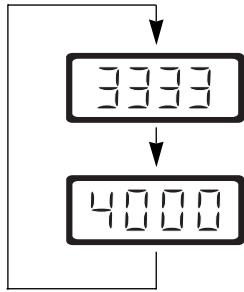
(6) Programming the Automatic Thread Trimmer and Wiper Movements with the Button E/Pro

This button programs the automatic trimmer and wiper after sewing. If the user presses this button in sequence, the location on the lights will change as shown in the figures below. This button offers the following three functions.

Automatic trimmer and wiper are not operating.	Only the automatic trimmer is operating	Both the automatic trimmer and wiper are operating

(7) Programming the Start and End B/T Stitches

① Press the appropriate button for 0.5 seconds for the place you wish to program the new B/T stitch value. The light will blink in that place.
  • Programming buttons for number of start B/T stitches：buttons A, B
  • Programming buttons for number of end B/T stitches：buttons C, D
	\<Initial Screen\>
	
	3333

② If the number is blinking, you can change the programmed value by pressing the appropriate button. (Ex：If you press the A button for 0.5 seconds, the first number in the screen will blink).	\<When the button A has been pressed for 0.5 seconds\> 3333
③ If programming is completed, press the same button for 0.5 seconds once more and you will return to the initial screen. (Ex : Changing the value of A, B, C, D from 3, 3, 3, 3 to 4, 4, 4, 4)	4444
[Caution] Be aware that if you don't press the button for 0.5 seconds, the screen will not return to the B/T stitch programming screen but will remain in the sewing conditions program change (items 1~4 functions) section.	

(8) Sewing Speed and Rotating Direction Programming Method

① If you press the E/Prg button for 0.5 seconds, you will see the screen that enables you to change the sewing speed. If you press the same button again for 0.5 seconds, you will see the screen that enables you to change the rotating direction. If you press the button one more time, you will return to the initial screen.
(Initial screen → Speed programming screen → Rotating direction programming screen → Initial screen)
	```3333```
	
	```4000```

② If you want to change the sewing speed, press the E/Prg button. After seeing the speed programming screen, press buttons A and B to program the speed you want.	

[Caution]
Be aware that if you don't press the button for 0.5 seconds, the screen will not return to the B/T programming screen but will remain in the sewing conditions programming screen (Items 1~4 functions).

(9) Method to Change Parameter Specific Items

① To change the parameter's detailed items, press the E/Prg and A buttons simultaneously and return to the parameter detailed item's initial screen.	<parameter specific item initial screen> ```PrEn```

② If you see the "PrEn" screen, select a parameter group using buttons A~D.
 • A button : A group, B button : B group
 • C button : C group, D button : D group
	<Initial screen for group A> <Initial screen for group B>
	```A-01``` ```b-01```
	<Initial screen for group C> <Initial screen for group D>
	```C-01``` ```d-01```

③ After selecting the group you want, use buttons A and B to select the specific item you want. • Ex: Select No. 2 item of Group A (Limiting the maximum sewing speed)	```A-02```
④ If you selected the specific item you wanted, press button C. The value you selected will then appear on the screen. • Ex : The current maximum sewing speed 4000RPM.	```4000```
⑤ Using the buttons A and B, change the current programmed value to another value. • Ex : Change the maximum sewing speed from 4000RPM to → 3000RPM	```3000```
⑥ If you completed your selection, press the C to save the value you chose.	

| ⑦ You can change other specific items of the parameter in the same manner. | |

[Caution]
• Be aware that if you changed the specific items of the parameter and didn't press the C button, the changed value will not be saved.
• If you change the parameter specific items carelessly, this may cause breakdown or physical damage to the machine. Therefore, the user must be well-trained before changing items in the parameter group.

(10) Start and End B/T Stitch Number Correction Method

| ① Corrections in the initial screen are the same as those in item (13) of the program unit manual "Correcting method for when the B/T number differs by one stitch"
    a. Check the present sewing condition.
    b. Change the value of the part that needs correction (use A, B, C, D buttons)
    c. Save the programmed value(press the E/Prg and B buttons simultaneously).
    →You will go to the "bt-C" screen. The buzzer will sound three times and you will return to the initial screen | 3333
↓
3545
↓
bt_C
↓
3333 |
| ② When making corrections of less than one stitch use items 30~33 of parameter Group B and will correct to stage 0.05. | |
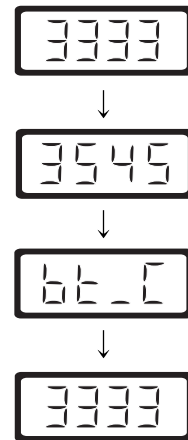
※ For detailed B/T stitch number correction method, refer to the section (13) of the Program Unit manual.

(11) Method of Use of the Inertia Tuning Function

①The inertia tuning function is to find the motor's gain value that match the weights inertia. Press buttons E/Prg and D simultaneously to return to the initial screen of the inertia tuning.	<Inertia tuning initial screen> tUnE
② If the initial screen comes on, press the pedal until you hear the buzzer ring. (During inertia tuning the sewing machine will operate and stop 10 times).	<Initial screen> 3333
③ If the inertia tuning is completed, the buzzer will ring and the initial screen will come on at the same time.	

[Caution]
Inertia tuning is carried out only when the controller is attached to the sewing machine for the first time and when the sewing machine is unable to accelerate or decelerate quickly.

10

FORTUNA SERIES 4 FULL FUNCTION SOFTWARE METHOD OF USE

1) Basic Functions of the Fortuna Series 4 Full Function Software

(1) Initializing

This function is used when the user randomly changes the parameter's programmed value, and forgets the original program contents.
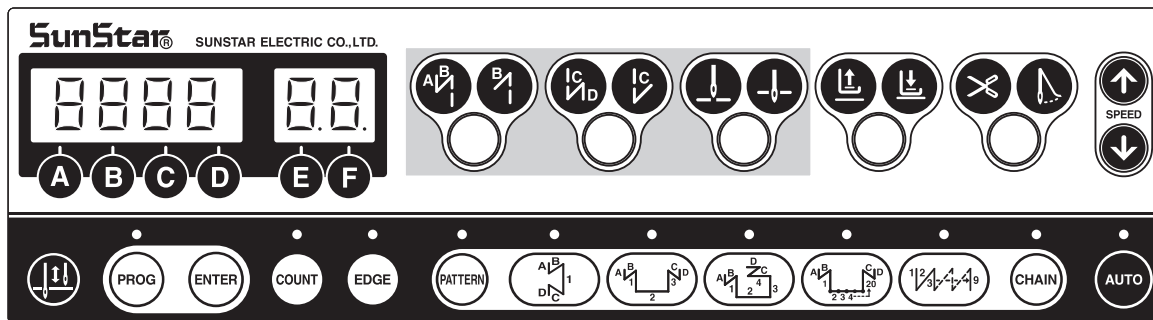
Method of initializing: Turn the power on by simultaneously pressing the buttons in the figure above which are the start B/T button + end B/T button + needle plate up/down stop button.

[Caution]
- If you initialize, all the changes made by the user are changed to the original values programmed when the machine was delivered from the factory, therefore only change the value if absolutely necessary.
- After initializing, rotate the machine for 1000RPM or more for approximately 5 seconds. You must make the machine remember the location of the FILM.

(2) Sewing Machine Up/Down Stop Location Automatic Recalling Function

When first purchasing the controller, if the user steps on the pedal for 5 seconds and runs the motor before beginning the sewing work, the machine will automatically remember the sewing machine's up/down stop location. However, when using a synchronizer this step is not necessary.

(3) Method of Use and Functions of the Program Unit and the General Control Box's Simple Operation Box.

When there is a program unit(P/U), use it to program or change all the functions of the machine. When there is no program unit, use the general control box operation panel to program or change all the functions of the machine.

※ For detailed information on the method of use of program units and simple operation panel refer to the explanation in the last section.
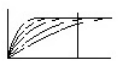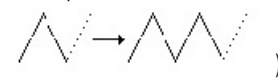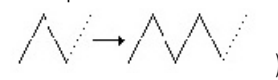
(4) Function Parameter

Parameter group	Functions
① Group A	General functions of the sewing machine
② Group B	All types of output, Full-on Time/PWM Duty, checking input/output operations, sewing machine models and thread trimming sequence programming
③ Group C	Pedal acceleration/deceleration curve, slow starting speed and input/output port change related parameters
④ Group D	All types of gain parameter related motor control

※ If the specific items of the parameter are changed carelessly, they could cause breakdown or damage the machine. Therefore the user must be well-trained before using it.

2) Fortuna Series 4 Full Function Software Specific Parameters

(1) Group A Parameter: General functions of sewing machine

No.	Function	Initial value	Range	Step
1	Minimum speed of pedal (limit of sewing machine's minimum speed)	200spm	20~510	2spm
2	Maximum speed of pedal (limit of sewing machine's maximum speed)	4000spm	40~9960	40spm
3	Thread trimmer speed (Sewing machine speed from beginning to end of thread trimming when using CAM type)	300spm	20~510	2spm
4	Program Unit + 1 stitch speed (🕛 Key's performance speed)	100spm	20~510	2spm
5	Lifting of needle plate with button A, dropping speed (⌐'s performance speed)	300spm	20~510	2spm
6	Pedal degree of acceleration (Pedal Curve) (;When the maximum speed is put in 255 steps)	255	1~255	1
7	Start Back-Tack Speed	1700spm	20~2000	10spm
8	End Back-Tack Speed	1700spm	20~2000	10spm
9	Thread trimming operation time (The A24 used in PNEUMATIC = must be 1) (The Solenoid operation time)	100ms	4~1020	(When doing an aging test, the value is equal to the running time)
10	Tension release operation time (The A24 used in PNEUMATIC = must be 1)	200ms	4~1020	(When doing an aging test, the value is equal to the thread trimming time)
11	Tension release time (In CAM type, the used A24 = must be 0) (In CAM type, the tension release is the value of the moving CAM angle)	255	0~255	
12	Waiting time for the next operation after thread trimming (This is the delaying time to carry out the next operation after thread trimming is finished)	4ms	4~1020	
13	Wiper operation time (Wiper Solenoid operating time)	48ms	4~1020	4ms
14	Waiting time after wiper operation(presser foot-lift etc.)	40ms	4~1020	4ms
15	Automatic presser foot-lift delaying time	100ms	4~1020	4ms
16	Automatic presser foot-lift maintaining time (After programmed time the presser foot-lift is automatically released)	300×0.1sec	5~1000	0.5sec
17	Automatic presser foot-lift drop waiting time for next operation (The delaying time, or the time that the foot-presser lift is maintained, the pedal is started until the presser foot-lift drops and the sewing machine is started)	100ms	4~1020	4ms
18	Selection for automatic foot-presser lift after thread trimming	0	0/1	1=lift selection 0=2step backward thread trimming
19	Selection for pedal thread trimming position	0	0/1/2	1=1 step backward thread trimming 2=thread trimming at neutral position
20	The maximum sewing speed for the KM-1060BL-7 presser foot-lift with mutual crossing quantity of 4.8~7.0[mm]	2000spm	200~2000	10spm
21	Delaying time for complete release of KM-1060BL-7 B/T Solenoid	200ms	4~1020ms	4ms
22	Select to operate 2 start B/T ( )	0	0/1	Choose between 1 or 2
23	Select to operate 2 end B/T ( )	0	0/1	Choose between 1 or 2

[Caution]

If the specific items of the parameter are changed carelessly, they could cause breakdown or damage the machine. Therefore, the user must be well-trained before using it.

No.	Function	Initial value	Range	Step
24	Selection of thread trimming conditions (selection according to sewing machine type)	0	0/1/2	0=CAM type machine 1= thread trimming after up-stop 2=thread trimming after low-stop
25	Whether or not to use default sequence when A24 = 1 (This is a sequence determined on A9,A10 value)	0	0/1	0=B-55 exclusive sequence is used 1= default sequence is used
26	Selection of B/T Solenoid operation position	0	0/1	0= lower position 1= upper position
27	Setting the maximum sewing speed of the machine according to presser foot-lift height of the KM-1060BL sewing machine.	?	?	Less than P1xx:3500[spm] Less than P2xx:3000[spm] Less than P3xx:2500[spm] More than P3xx: A20[spm] program P1xx → P2xx → P3xx in order
28	Needle bar's automatic stop at the highest position	0	0/1	
29	Pedal analog filtering difference	10	1~30	1
30	When using an angle 2-needle, select the semi-automatic corner operation	0	0/1	1=selection of semi-automatic
31	Speed when selecting a semi-automatic corner (parameter used only when used after selecting number 30)	200spm	20~2000	10spm
32	After selecting the left needle the first sewing stitch (parameter used only when used after selecting number 30)	3 stitches	0~255	1 stitch
33	After selecting the left needle the second sewing stitch (parameter used only when used after selecting number 30)	3 stitches	0~255	1 stitch
34	After selecting the right needle the first sewing stitch (parameter used only when used after selecting number 30)	3 stitches	0~255	1 stitch
35	After selecting the right needle the second sewing stitch (parameter used only when used after selecting number 30)	3 stitches	0~255	1 stitch
36	Maintaining time for the left/right needle solenoid (After the programmed time the solenoid is automatically released)	450×0.1sec	(50~1000)	0.5sec
37	Set grease check function	0	0/1	0 : Not used 1 : Used
38	Set grease check time	750 (hour)	0~9999	1 (hour)
39	Stopping function during AUTO mode and while pedal is neutral	1	0/1	0=does not stop 1=stops
40	Selection of type of N-stitch Sensor	0	0 : active high	1 : active low
41	The number of stitches done after the N-stitch Sensor has finished sensing. (After sensing, it will sew the programmed number of stitches and stop)	3 stitches	0~255	1 stitch
42	N-stitch sewing speed	1000spm	20~2000	10spm
43	Selection of One Touch function (Used in the sewing mode that uses the auto function)	0	0/1	1=Auto Mode
44	Selection of One Touch function (If there is no thread trimming signal when selected, sewing will continue even if user releases pedal)	0	0/1	1=One-Shot Mode
45	One-Shot sewing speed	2000spm	40~9960	40spm
46	N-stitch sewing mode selection → a sewing mode that inputs a sensor signal in the edge sensor port and uses it as an edge sensor	0	0/1	1=N-stitch Mode
47	Selection of pre-stitch function (When selected it will perform only the programmed stitches before the actual sewing work starts)	0	0/1	1=selection
48	Pre-stitch number of stitches	3 stitches	0~255	1 stitch
49	Pre-stitch speed	2000spm	20~2000	10spm

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

No.	Function	Initial value	Range	Step
50	Selection of start B/T operating conditions (0 : if pedal is released during back tack, it will stop) (1 : if pedal is released during back tack, the work will still be completed) (2 : it will perform the exact amount of back tack stitches)	1		0 : B/T stop function selected 1 : B/T work completion 2 : B/T exact stitch performance
51	Selection of end back tack performance condition (It will perform the exact amount of stitches for end back tack)	0	0/1	1= exact stitch performance
52	Back tack initial first stitch speed during back tack exact performance	200spm	20~1000	10spm
53	Change between B/T and switch with buttons A or B during sewing	0	0/1	1= Select with button B

54	Selection of button A function	2		0 : Only B/T operates
				1 : Lift and drop needle plate with one movement.
				2 : Lift needle plate with one movement.
				  Drop needle plate with two movements
				3 : Slow performance when stopped
				  (1/2 stitch speed)

55	Selection of Button B function	0		0 : B/T delete insertion 1 : Lift and drop needle plate with one movement 2 : Slow performance when stopped (1/2 stitch speed) 3 : Only B/T operates
56	Selection of speed during manual back tack during sewing	0	0/1	0 : current sewing speed 1: initial reverse speed
57	NOT USED			
58	Thread Trimming Sequence Selection of SunStar Chain Stitch Machine	1	0/1	1
59	Thread Trimming Sequence Selection of other Company chain Stitch Machine	0	0/1	1
60	Selection of reverse rotation after trimming	0	0/1	1:selection of reverse direction
61	Reverse rotation distance when selecting reverse rotation after thread trimming	20degree	0~250	1degree
62	When machine stops fix pulley (When machine stops fix the motor by force)	0	0/1	1: fix when machine stops
63	Power to fix the A number 62 Pulley	40	10~100	1
64	Distance recovered after fixing A number 62 Pulley and rotating it by force	20degree	10~100	1degree
65	Select the motor rotating direction (clockwise /counterclockwise)	1	0/1	1 : clockwise 0 : counterclockwise
66	Target speed : If this speed is reached or passed, a signal saying "Target speed has been reached" will appear.	1000spm	40~9960	40spm
67	Delay start setup	0	0/1	0=normal start 1=Delay start
68	Delay start time duration setup	3	3~250	1×100[ms]
69	Setup of needle bar's stop at the lowest position after trimming when the pedal is pressed	0	0/1	0=disabled 1=enabled
70	Setup of the duration of needle bar's stop at the lowest position after trimming when the pedal pressed	100	100~250	1[ms]
71	Fixing of edge sensor	0	0/1	0=disabled 1=enabled
72	Detection time of high-voltage error	10	2 ~1020[ms]	2 [ms]
73	Use of the upper trimming device	0	0/1	0=disabled 1=enabled

[Caution]

If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

(2) Group B Parameter : All types of output, Full-on Time/PWM Duty, checking input/output operations, sewing machine models and thread trimming sequence programming.

※ These are functions not used by general users and must be regulated by an A/S technician.

No.	Function	Initial value	Range	Step
1	Back Tack Solenoid Initial Full On Time	1020ms	4~1020	4ms
2	Presser Foot-Lift Solenoid Initial Full On Time	200ms	4~1020	4ms
3	T/T Solenoid Initial Full On Time	100ms	4~1020	4ms
4	Wiper Solenoid Initial Full On Time	100ms	4~1020	4ms
5	Tension Release Solenoid Initial Full On Time	100ms	4~1020	4ms
6	Left Solenoid Initial Full On Time (For Twin Needle)	100ms	4~1020	4ms
7	Right Solenoid Initial Full On Time (For Twin Needle)	100ms	4~1020	4ms
8	Auxiliary Solenoid Initial Full On Time	100ms	4~1020	4ms
9	Left LED Initial Full On Time (For Twin Needle)	100ms	4~1020	4ms
10	Right LED Initial Full On Time (For Twin Needle)	100ms	4~1020	4ms
11	Needle plate up-stop signal Initial Full On Time	100ms	4~1020	4ms
12	Needle plate down-stop signal Initial Full On Time	100ms	4~1020	4ms
13	Signal notifying motor running Full On Time	100ms	4~1020	4ms
14	Signal notifying target speed achieved Full On Time	100ms	4~1020	4ms
15	Back Tack Solenoid Duty Ratio	50%	0~100	10%
16	Presser Foot-Lift Solenoid Duty Ratio	20%	0~100	10
17	Thread Trimming Solenoid Duty Ratio	100	0~100	10
18	Wiper Solenoid Duty Ratio	100	0~100	10
19	Tension Release Solenoid Duty Ratio	100	0~100	10
20	Left Solenoid Duty Ratio (For Twin Needle)	50	0~100	10
21	Right Solenoid Duty Ratio (For Twin Needle)	50	0~100	10
22	Aux Solenoid Duty Ratio	100	0~100	10
23	Left LED Duty Ratio (For Twin Needle)	100	0~100	10
24	Right LED Duty Ratio (For Twin Needle)	100	0~100	10
25	Signal for up stopping needle Duty Ratio	100	0~100	10
26	Signal for low stopping needle Duty Ratio	100	0~100	10
27	Signal notifying motor running Duty Ratio	100	0~100	10
28	Signal notifying target speed reached Duty Ratio	100	0~100	10
29	NOT USED			
30	Start Back Tack A number of stitches correction value	00.30	6~6	0.05 Stitch
31	Start Back Tack B number of stitches correction value	00.30	6~6	0.05 Stitch
32	End Back Tack C stitch correction value	00.40	6~6	0.05 Stitch
33	End Back Tack D stitch correction value	00.40	6~6	0.05 Stitch
34	Selection for maintaining reverse solenoid movement when thread trimming (C Only B/T)	0	0/1	1=reverse direction maintained
35	Programming count condition (program whether or not automatic counter will be operated)	0	0/1	0=counter used 1=automatic counter after thread trimming
36	When automatically counting, select Up/Down count after thread trimming (thread trimming function must be enabled)	1	0/1	1=Up COUNT 0=DOWN COUNT
37	When count in completeded, the next operation is programmed	0	0/1/2	0=buzzer rings, sewing is allowed 1=buzzer rings, sewing is not allowed (If you press the Prog Key, set up is cancelled) 2=No buzzer ring, sewing is allowed
38	When count is completed, select the counter auto clear/preset	0	0/1	1=AUTO CLEAR/PRESET
39	Bobbin counter set-up	0	0/1	0=Bobbin counter Disable 1=Bobbin counter Enable

※ Items No. 30~33 : These are the items that make the number of stitches match when back tack number of stitches do not match.
※ Solenoid Duty Ratio : The power that holds and maintains the solenoid.
  Solenoid initial full on time : The time it takes to pull the solenoid to the maximum in the outset.

[Caution]

If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

No.	Function		Initial value	Range	Step
40	Checks operation of B/T solenoid	(OUTPUT00)			
41	Checks operation of P/F solenoid	(OUTPUT01)			
42	Checks operation of T/T solenoid	(OUTPUT02)			
43	Checks operation of W/P solenoid	(OUTPUT03)			
44	Checks operation of T/R solenoid	(OUTPUT04)			
45	Checks operation of left solenoid	(OUTPUT05)	※After matching the number of the solenoid being tested, press the "+1stitch( )" key and check the condition of the movement. - Along with the output, it will say "on", or "off"		
46	Checks operation of right solenoid	(OUTPUT06)			
47	Checks operation of Aux. solenoid	(OUTPUT07)			
48	Checks operation of Left LED solenoid	(OUTPUT10)			
49	Checks operation of Right LED solenoid	(OUTPUT11)			
50	Checks operation of needle when signal notifies up stop	(OUTPUT12)			
51	Checks operation of needle when signal notifies down stop	(OUTPUT13)			
52	Checks operation of signal notifying motor running	(OUTPUT14)			
53	Checks operation signal notifying target speed has been reached	(OUTPUT15)			
54	Select [Thread trimming sequence] - The default is set to '0'. If you wish to input another sequence apart from the thread trimming sequence provided in the system input the newly composed sequence number. (Refer to the sequence composition method)		0	0~64	1
55	Thread trimming sequence data writing function				
56	Selecting sewing machine model - write the number that fits the sewing machine model provided in the full function manual.. - thread trimming sequence in the pertinent machine is copied. - if you want to correct the thread trimming sequence, change the contents of item B-55. (※However, be aware that if you initialize the parameter, the newly programmed changes will disappear and the thread trimming sequence will change to that of [SunStar 235/250]).		0	0~127	1 0~ 74 (non-order made) 75~118 (order-made) (Refer to attached material)
57	Independent operation of trimming sequence		0	0/1	0=operation after trimming 1=independent operation
58	Presser foot-lift solenoid slowing down time #1 (Applied only when it is full-on condition)		40ms	2~510ms	2ms
59	Presser foot-lift solenoid slowing down time #2 (Applied only when it is PWM)		30ms	2~510ms	2ms

※ Items No. 40~53 : functions that check if solenoid and other output signals are working properly.

※ Select Item No. 55 and press the Enter key. Along with the buzzer sound you will see the words "Seq 55" appear on the screen. Thread trimming sequence composition permitting condition is now possible. You can program a thread trimming sequence to a maximum of 64 bytes. (For thread trimming sequence program method, refer to attached material).

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

No.	Function		Initial value	Range	Step
60	Checks the signal input INPUT00	(Button A)			
61	Checks the signal input INPUT01	(Button B)			
62	Checks the signal input INPUT02	(1/4 stitch Switch)			
63	Checks the signal input INPUT03	(2/4 stitch Switch)			
64	Checks the signal input INPUT04	(3/4 stitch Switch)			
65	Checks the signal input INPUT05	(4/4 stitch Switch)			
66	Checks the signal input INPUT06	(Left Switch)			
67	Checks the signal input INPUT07	(Right Switch)	Along with the input, it will say "on" or "off"		
68	Checks the signal input INPUT10	(Manual presser foot-lift Switch)			
69	Checks the signal input INPUT11	(Counter Switch)			
70	Checks the signal input INPUT12	(PU 1/2 stitch Button)			
71	Checks the signal input INPUT13	(Safety Switch)			
72	Checks the signal input INPUT14	(Edge Sensor)			
73	Checks the signal input INPUT15	(Thread trimming not allowed)			
74	Checks the signal input INPUT20	(First step for pedal going forward)			
75	Checks the signal input INPUT21	(First step for pedal going backwards)			
76	Checks the signal input INPUT22	(Second step for pedal going backwards)			
77	Checks the solenoid movement voltage			0~64	
78	Checks external volume value			0~64	
79	Checks the pedal analog output			0~64	
80	Checks the synchronizer signal				Increases by each rotation of the sewing machine
81	Checks the signal from encoder A/B				1) increases when sewing machine rotates clockwise 2) decreases when sewing machine rotates in counterclockwise
82	Checks the signal from encoder R/S/T				1) When sewing machine is rotating clockwise 101→100→110→010→ 011→001→101 2) When sewing machine is rotating counterclockwise 101 → 001 → 011 → 010→ 110 → 100 →101
83~	NOT USED				
89	NOT USED				

※ Items No. 60~76: functions that check individual normal movement.

※ Items No. 77~79 : functions that check each analog input normal movement.

※ Item No. 80 : function that checks whether the synchronizer signal is working properly.

※ Item No. 81 : function that checks whether the encoder A/B is working properly.

※ Item No. 82 : function that checks whether the encoder R/S/T is working properly.

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

No.	Function	Initial value	Range	Step
90	Sewing machine pulley size	?	0~9999	1pulse
91	Distance between up-stop ~ low-stop (the standard is the pulley's normal direction rotation)	?	0~9999	1pulse
92	Programming the upper stop location (the standard is the pulley's normal direction rotation) - Not valid for model S-III	?	0~359	1degree
93	Programming the low-stop location (the standard is the pulley's normal direction rotation) - Not valid for model S-III	?	0~359	1degree
94	Index pulse occurring position (the standard is the pulley's normal direction rotation) - Turn the pulley manually and stop it in the position you want.	?	0~359	1degree
95	CAM type thread release solenoid operation position - Turn the pulley manually and stop it in the position you want.	?	0~359	1degree
96	CAM type thread release solenoid release position - Turn the pulley manually and stop it in the position you want.	?	0~359	1degree
97	CAM type thread trimming solenoid operation position - Turn the pulley manually and stop it in the position you want.	?	0~359	1degree
98	CAM type thread trimming solenoid release position - Turn the pulley manually and stop it in the position the user wants	?	0~359	1degree
99	Manual and automatic set up of solenoid operation / release position in CAM type thread trimming	1	0/1	0=manual set up 1=automatic set up

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

(3) Group C Parameter: Pedal acceleration/deceleration curve, slow starting speed and input/output port change related parameter

※ These are functions not used by general users and must be regulated by an after-sales service engineer.

No.	Function	Initial value	Range	Step
1	1 step section where pedal moves forward	17	0~64	1
2	2 step section where pedal moves forward	22	0~64	1
3	3 step section where pedal moves forward	38	0~64	1
4	4 step section where pedal moves forward	47	0~64	1
5	5 step section where pedal moves forward	59	0~64	1
6	Sewing speed value in the 1 step where pedal moves forward	440spm	40~9960	40spm
7	Sewing speed value in the 2 step where pedal moves forward	920spm	40~9960	40spm
8	Sewing speed value in the 3 step where pedal moves forward	4000spm	40~9960	40spm
9	Sewing speed value in the 4 step where pedal moves forward	5480spm	40~9960	40spm
10	Sewing speed value in the 5 step where pedal moves forward	9960spm	40~9960	40spm
11	Select slow start after thread trimming (After performing thread trimming, start the next sewing work slowly)	0	0/1	1=selection
12	Select slow start after sewing machine stops (After performing sewing machine stops, start the next sewing work slowly)	0	0/1	1=selection
13	When starting slowly, select sewing speed change	0	0/1	1=Use C14~C18 value 0=Use default value
14	The speed of the first stitch when starting slow	400spm	40~9960	40spm
15	The speed of the second stitch when starting slow	400spm	40~9960	40spm
16	The speed of the third stitch when starting slow	640spm	40~9960	40spm
17	The speed of the fourth stitch when starting slow	1000spm	40~9960	40spm
18	The speed of the fifth stitch when starting slow	1680spm	40~9960	40spm
19	Limited maximum motor speed	4000rpm	20~5000	20rpm
20	Synchronizer sensor rotation sensing time	40×0.1sec	5~1275	0.5sec
21	Overload sensing time	30×0.1sec	5~1275	0.5sec
22	NOT USED	100ms	4~1020	4ms
23	Power off sensing time	4ms	4~1020	4ms
24	NOT USED			
25	Bad signal of the Encoder A and B phase detecting number of time	4	1~255	1
26	Back siginal of the Encoder R, S and T phase detecting number of time	4	1~255	1
27	Bad siginal of the Encoder R, S and T phase detecting number of time	4	1~255	1
28	NOT USED			
29	• Automatic scaling to the speed curve selected by each set mode - Mode 0 : Use a curve based on the set values from C-1 to C-10 - Mode 1 : Scaling to the speed set at A-2 - Mode 2 : Scaling to the speed set using the Speed Up/Dn key	1	1~2	1
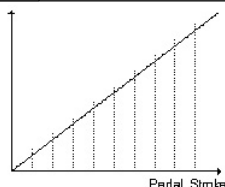
Pedal Stroke

※ Items No. 1~5 : Equal division of pedal stroke in 64 steps, The speed curve of the pedal stroke changes according to how many steps are set up for the divided pedal stroke of each forward pedal step. (Used when adjusting pedal sensor)

※ No. 20 : If a synchronizer signal comes, but the next synchronizer signal does not come within the sensing time, an error message will appear .

※ No. 21 : If a speed instruction was sent to the motor but the motor does not reach the value of the speed instruction, an error message will appear.

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

※ This item is operated by the factory only, so general users and A/S technicians should not use it.

No.	Function		Initial value	Step
30	OUTPUT00 (B/T Solenoid)	: Low Active	0(Fixed)	
31	OUTPUT01 (P/F Solenoid)	: Low Active	1(Fixed)	
32	OUTPUT02 (T/T Solenoid)	: Low Active	2	
33	OUTPUT03 (W/P Solenoid)	: Low Active	3	
34	OUTPUT04 (T/R Solenoid)	: Low Active	4	
35	OUTPUT05 (Left Solenoid)	: Low Active	5	※ Output port changing function
36	OUTPUT06 (Right Solenoid)	: Low Active	6	- write the function number on
37	OUTPUT07 (AUX Solenoid)	: Low Active	7	the output PIN you want to
38	OUTPUT10 (Left LED)	: High Active	8	change after referring to the
39	OUTPUT11 (Right LED)	: High Active	9	table below
40	OUTPUT12 (Needle upper stop notifying signal)	: High Active	10	
41	OUTPUT13 (Needle lower stop notifying signal)	: High Active	11	
42	OUTPUT14 (Signal notifying motor is running)	: High Active	12	
43	OUTPUT15 (Signal notifying target has been reached)	: High Active	13	

★ A : Output PIN function

Function No.	H/W type actual output name		Function No.	H/W type actual output name	
0	B/T Solenoid	(with duty)	100	inv. B/T Solenoid	(with duty)
1	P/F Solenoid	(with duty)	101	inv. P/F Solenoid	(with duty)
2	T/T Solenoid	(with duty)	102	inv. T/T Solenoid	(with duty)
3	W/P Solenoid	(with duty)	103	inv. W/P Solenoid	(with duty)
4	T/R Solenoid	(with duty)	104	inv. T/R Solenoid	(with duty)
5	Left Solenoid	(with duty)	105	inv. Left Solenoid	(with duty)
6	Right Solenoid	(with duty)	106	inv. Right Solenoid	(with duty)
7	AUX Solenoid	(with duty)	107	inv. AUX Solenoid	(with duty)
8	Left LED	(with duty)	108	inv. Left LED	(with duty)
9	Right LED	(with duty)	109	inv. Right LED	(with duty)
10	"Needle Up-stop" notifying signal	(with duty)	110	inv. Needle Up-Stopped	(with duty)
11	"Needle Down-stop" notifying signal	(with duty)	111	inv. Needle Down-Stopped	(with duty)
12	"Sewing machine running" notifying signal	(with duty)	112	inv. Motor Running	(with duty)
13	"Target speed" notifying signal	(with duty)	113	inv. Target Speed	(with duty)
14	"Trimming" notifying signal	(without duty)	114	inv. Trimming	(without duty)
15	"End Back Tack" notifying signal	(without duty)	115	inv. End Back Tack	(without duty)
16	"Emergency stop" notifiying signal - A signal appears when the motor stops for any error.	(without duty)	116	inv. Emergency Stopped -A signal appears when the motor stops for any error	(without duty)
17	Roller Lift Solenoid	(without duty)	117	inv. Roller Lift Solenoid	(without duty)
18	Hemming Device Output	(without duty)	118	inv. Hemming Device Output	(without duty)
19	"First step forward pedal" notifying signal	(without duty)	119	inv. Pedal Start	(without duty)
200	Low signal	(without duty)	201	High signal	(without duty)

※ If an output signal has been sent twice in the OUTPUT00~OUTPUT15 output pin, the same signal will appear in two different output pins.
  Ex) if OUTPUT00 = 0 & OUTPUT03 = 0, then B/T signal is output from both OUTPUT00 & OUTPUT03 pin
※ When setting up other functions apart from the function numbers listed above, the pertinent output pin functions are disregarded.
※ Roller Lift Solenoid = Presser Foot-Lift solenoid + Back Tack solenoid + Roller Lift Switch

44~	NOT USED		
49	NOT USED		

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

No.	Function	Initial value	Step
50	INPUT00 (Button A)	0	
51	INPUT01 (Button B)	1	
52	INPUT02 (1/4 stitch Switch)	2	
53	INPUT03 (2/4 stitch Switch)	3	
54	INPUT04 (3/4 stitch Switch)	4	
55	INPUT05 (4/4 stitch Switch)	5	
56	INPUT06 (Left Sol. Switch)	6	※ Output port changing function
57	INPUT07 (Right Sol. Switch)	7	- Write the function number
58	INPUT10 (Presser Foot-Lift Switch)	8	on the output PIN you want
59	INPUT11 (Counter Switch)	9	to change after referring to
60	INPUT12 (P/U 1/2 stitch Switch Signal)	10	the table below
61	INPUT13 (Safety Switch Signal)	11	
62	INPUT14 (Edge Sensor Signal)	12	
63	INPUT15 (Thread trimmer not allowed Signal)	13	
64	INPUT20 (Pedal Start Signal)	16	
65	INPUT21 (Pedal Presser Foot-Lift Signal)	17	
66	INPUT22 (Pedal Trim Signal)	18	

★ B : Input PIN function

No.	Actual Hardware Output Name	No.	Actual Hardware Output Name
0	Button A Switch	100	inv Button A Switch
1	Button B Switch	101	inv Button B Switch
2	1/4 stitch Switch	102	inv 1/4 stitch Switch
3	2/4 stitch Switch	103	inv 2/4 stitch Switch
4	3/4 stitch Switch	104	inv 3/4 stitch Switch
5	4/4 stitch Switch	105	inv 4/4 stitch Switch
6	Left Solenoid Switch	106	inv Left Solenoid Switch
7	Right Solenoid Switch	107	inv Right Solenoid Switch
8	Presser Foot-Lift Switch	108	inv Presser Foot-Lift Switch
9	Counter Switch	109	inv Counter Switch
10	Program Unit 1/2 stitch Switch	110	inv Program Unit 1/2 stitch Switch
11	Safety Switch	111	inv Safety Switch
12	Edge Sensor Signal	112	inv Edge Sensor Signal
13	Thread Trimmer Signal	113	inv Trimming Disabled Signal
14	Roller Lift Switch	114	inv Roller Lift Switch
15	N_AUTO Switch	115	inv N_AUTO Switch
16	Pedal Start Signal	116	inv Pedal Start Signal
17	Pedal Presser Foot-Lift Signal	117	inv Pedal Presser Foot-Lift Signal
18	Pedal Thread Trimming Signal	118	inv Pedal Thread Trimming Signal
19	External Signal	119	inv External Signal
20	Machine-Head-Open Switch	120	inv Machine-Head-Open Switch

※ Caution : When any inputs PIN No. INPUT00 ~ INPUT22 are overlapped, it works as the "OR" circuit.
　Ex) if INPUT00 = 0 & INPUT01 = 0, then it is recognized as "button A" = INPUT00 + INPUT01.
※ The hardware of input switches and sensors are done with "a point of contact/Active High" input as the standard.
※ When setting up other functions numbers apart from the ones listed above, the pertinent output pin functions are disregarded.

70	Output Signal Level Collective Reverse Function	0	0/1	1=Output signa Collective Reverse, selection
71	Input Signal Level Collective Reverse Function	0	0/1	1=Input signal Collective Reverse, selection
72~	NOT USED			
99	NOT USED			

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be
well-trained before using it.

(4) Group D Parameter: All types of gain parameter related motor control
　　※ These are functions not used by general users and must be regulated by an A/S technician.
　　※ The set value which listed below may show difference depends on motor.

No.	Function		Initial Value	Range	Step
1	speed P-gain	Kvp	20	0~30	1
2	speed D-gain	Kvd	20	0~300	1
3	location P-gain	Kpp	170	0~500	1
4	location D-gain	Kpd	2000	0~3000	1
5	acceleration A	accelA	40	1~50	1
6	acceleration B	accelB	70	1~50	1
7	acceleration C	accelC	40	1~50	1
8	acceleration D	accelD	8	1~50	1
9	sewing machine inertia value	Inertia	40	0~255	1
10	positioning speed	Wpos	220 rpm	100~500	2 rpm
11	stopping speed	Wstop	75 rpm	0~500	2 rpm
12	Stop delaying time	StopDelay	80 ms	4~1020	4 ms
13	Positioning distance	DIST1	80 degree	0~255	1 degree
14	upper speed instruction unit	spd_unit	100 spm	1~100	1 spm
15	Positioning P-gain	Kpp2	400	0~500	1
16	Positioning D-gain	Kpd2	4000	0~5000	1
17	Positioning P-gain	Kpp3	100	0~500	1
18	Positioning D-gain	Kpd3	1800	0~5000	1
19~	NOT USED				
99	NOT USED				

[Caution]
- If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.
- When you start tuning with the default values, the parameter values above will be adjusted to the load level and the set value will differ from the default value.

3) Method of Use and Explanations for Specific Items of the Parameter

(1) Method of Use and Explanations for Specific Items of the Group A Parameter

(General functions of sewing machine)

A. Minimum/maximum sewing speed limit set up method and thread trimming speed set up method

Item No.	Name of function	Method of use and explanation
A-1	Minimum sewing speed limit set up	This item allows user to set up the minimum sewing speed limit or the minimum sewing speed given whenthe pedal is pressed.(20~510rpm, Initial value : 200rpm)
A-2	Maximum sewing speed limit set up	This item allows user to set up the maximum sewing speed limit or the maximum sewing speed given when the pedal is pressed.(40~9960rpm, Initial value : 4000rpm)
A-3	Thread trimming speed set up	This item allows the user to set up the thread trimming speed when the thread trimming function is operating after sewing

B. Set up method of $\frac{1}{2}$stitch speed by program unit(P/U) and needle plate lift/drop by button A

Item No.	Name of function	Method of use and explanation
A-4	Set up method of $\frac{1}{2}$ stitch speed by program unit (P/U)	This item allows user to set up the $\frac{1}{2}$ stitch speed by program unit (P/U) and hence sets up the $\frac{1}{2}$ stitch operating speed. However, if set up to a rapid speed, many stitches may be sewn after pressing the button.
A-5	Set up the speed of lift/drop of needle plate with button A	This item allows user to set up the speed of lift/drop of the needle plate with button A. However, if set to a rapid speed, many stitches may be sewn after pressing the button.

C. Start B/T sewing speed and end B/T sewing speed set up method

Item No.	Name of function	Method of use and explanation
A-7	Start B/T speed set up	This item allows user to set up the start B/T speed. If the speed is changed, the stitch correction value also has to be set again.
A-8	End B/T speed set up	This item allows user to set up the end B/T speed. If the speed is changed, the stitch correction value also has to be set again.

D. Selection method of thread trimming location with pedal

Item No.	Name of function	Method of use and explanation
A-19	Start B/T speed set up	You can change the thread trimming operation through pedal position by making the following changes to the set up values. • 0 : When the pedal position is backward 2 gear, operate thread trimming(Starting set up value). • 1 : When pedal position is backward 1 gear, operate thread trimming • 2 : When pedal position is neutral, operate thread trimming.

E. Edge Sensor method of use Item No.

| Item No.	Name of function	Method of use and explanation
A-40	Selection of edge sensor type	The set up method changes according to the set up parts of edge sensor • 0 : When edge is sensed and using high output sensor. • 1 : When edge is sensed and using low output sensor.
A-41	Stitches performed after edge sensor sensing	A function that programs the machine to stop after sewing a programmed amount of stitches when edge is sensed.
A-42	Sewing speed of stitches performed after edge sensor sensing	A function that programs the sewing speed after sewing a programmed amount of stitches when edge is sensed.
A-46	Selection of edge sensing sewing mode (select N-stitch mode)	A function that programs the edge sensor to operate normally, even when other sensor signals are inputted in the edge sensor port.

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

F. Pre-stitch function method of use and explanation

Item No.	Name of function	Method of use and explanation
A-47	Selection of pre-stitch function	The pre-stitch function is a function that programs the machine to sew a certain amount of stitches before commencing the actual sewing work.(0 : disable, 1 : enable)
A-48	Set pre-stitching stitch number	This item sets the number of stitches when using the pre-stitch function (0~255 stitches, Initial value : 3 stitches)
A-49	Set pre-stitching speed	This item sets the sewing speed when using the pre-stitch function. (20~2000rpm, Initial value : 2000rpm)
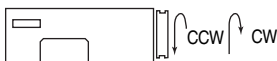
G. Method to select beginning/ending reverse sewing conditions

Item No.	Name of function	Method of use and explanation
A-50	Selection of start B/T conditions (Initial value : 1)	The start B/T function can be one of the following three operations according to their set up value • 0 : If user releases pedal during B/T operation, sewing stops. • 1 : If user releases pedal during B/T operation, sewing stops after finishing work. • 2 : The exact amount of stitches is operated, notwithstanding the number of stitch corrections. However, if this function is used, B/T will no operate naturally.
A-51	Selection of end B/T conditions (Initial value : 0)	This item selects whether or not to use the end B/T's exact number of stitches function operation • 0 : exact number of stitches function disabled • 1 : exact number of stitches function enabled (If this function is used, reverse sewing will no operate naturally)
A-52	The speed of the first stitch during B/T exact performance	This item selects the speed of the initial reverse stitch when user has selected the exact number of stitches function in the B/T operation(20~1000rpm, Initial value : 200rpm)

H. Method to select buttons A/B functions

Item No.	Name of function	Method of use and explanation
A-54	Selection of button A function (Initial value : 2)	The function of button A can be one of the following four operations according to their set up value. • 0 : If user presses A button while sewing, B/T sewing is operated while user keeps on pressing it. • 1 : If user presses the A button while sewing, B/T sewing is operated. If user stops sewing and presses A button once the needle plate is lifted. If user presses it once more, the needle plate is dropped • 2 : If user presses the A button while sewing, B/T sewing is operated while user keeps on pressing it. If user stops sewing and presses A button once, the needle plate is lifted. If user presses it twice consecutively, the needle plate is dropped. • 3 : If user presses A button while sewing, B/T sewing is operated while user keeps on pressing it. When user stops sewing and presses the A button, 1/2 stitch speed is operated.
A-55	Selection of button B function (Initial value : 0)	The function of button A can be one of the following four operations according to their set up value. • 0 : This item has the function of inserting/deleting the B/T sewing when user presses the B button. If the user presses the B button where there is no B/T sewing section, B/T sewing is inserted and when it is pressed where there is a B/T sewing section, B/T sewing is deleted. • 1 : If user presses the B button once, the needle plate is lifted and if user presses it once more, it is dropped • 2 : When user stops sewing and presses the B button, 1/2 stitch speed is operated while user presses it. • 3 : When sewing, B/T sewing is operated while user presses B button.

I. Method of use of motor rotating direction selection function

Item No.	Name of function	Method of use and explanation
A-65	Selecting the motor's rotating direction	This item sets up the set up value according to the motor's rotating direction • 0 : clockwise rotation • 1 : counterclockwise rotation(Initial value) CCW CW

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

(2) Group B Parameter Specific Method of Use and Explanation (All types of output, Full-on Time/PWM Duty, checking the input/output movements, sewing machine models and thread trimming sequence programming)

※ These are functions not used by general users and should be regulated by an A/S technician.

A. All types of output, Full-on Time/PWM Duty time set up method (all types of solenoids, LED and signals)
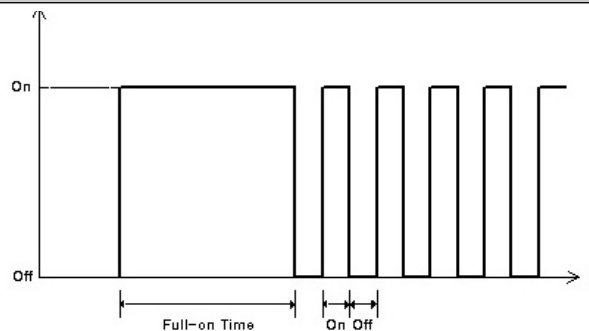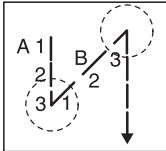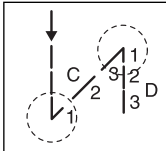
Item No. B-1 ~ B-28
 <Type of wave that has a certain amount of Full-on Time and 50% duty>
This figure explains the Full-on Time and PWM Duty. This figure shows the wave type graph where the machine maintains the power 'ON' for a certain amount of time and when that 'Full-on Time' passes, changes itself to a PWM signal with a certain duty. In other words, the certain amount of time that each device starts operating until they become completely, the output wave type maintains itself "On", and when it maintains itself operating the output becomes the duty PWM wave type to maintain operation.

B. B/T stitch correction set up method

Item No.	Name of function	Method of use and explanation	
B-30	Start B/T A side stitch correction value	This item has the function of correcting the B/T sewing stitch that has not been shaped well, and you can change the value of sides A, B, C, D. • The programmed value in the beginning A : 3, B : 3, C : 4, D : 4 • Program range : 0 ~ 9	
B-31	Start B/T B side stitch correction value		
B-32	End B/T C side stitch correction value		
B-33	End B/T D side stitch correction value		
• If the stitch correction values is changed using the program unit, the item value will automatically change. Reversely, if you change the programmed value of the items above, the stitch correction values will also automatically change. • Detailed correction principles and methods of use are the same as the program unit's stitch correction method. Please refer to the program unit method of use of start/end B/T stitch correction method.			

C. Counter function method of use

Item No.	Name of function	Method of use and explanation
B-35	Counter condition set up	For detailed method of use and explanation of counter function, refer to the program unit's counter set up button method of use.
B-36	When using automatic counter after trimming, select increasing/decreasing counter	
B-37	After counter operation is over, set up the next operation	
B-38	After counter operation is over, select the automatic erasing operation	

[Caution]

If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

(3) Group C Parameter Specifics Method of Use and Explanation
(Pedal acceleration/deceleration curve, slow starting speed, input/output port change related parameter)
※ These are functions not used by general users and should be regulated by an A/S technician.
A. Pedal stroke step by step section and speed set up method

Item No.	Name of function	Beginning value	Method of use and explanation
C-1	pedal forward first step section	17	After dividing the pedal stroke to 64 steps, the pedal stroke's acceleration/deceleration curve changes according to which stroke step is programmed from pedal forward steps 1 through 5.
C-2	pedal forward second step section	22	
C-3	pedal forward third step section	38	
C-4	pedal forward fourth step section	47	
C-5	pedal forward fifth step section	59	
C-6	sewing speed during pedal forward first step	440rpm	The pedal stroke's acceleration/deceleration curve changes according to how the pedal forward step by step sewing speed set up is done.
C-7	sewing speed during pedal forward second step	920rpm	
C-8	sewing speed during pedal forward third step	4000rpm	
C-9	sewing speed during pedal forward fourth step	5480rpm	
C-10	sewing speed during pedal forward fifth step	9960rpm	

B. Slow-start sewing method of use : this function allows to start the sewing slowly and the user can set up the following specific items.

Item No.	Name of function	Method of use and explanation
C-11	Slow Start after thread trimming	These items help you choose at which point you can apply slow start. If you want to apply it after thread trimming set item No. C-11 value to 1. If you want to apply it after when you start sewing after stopping set item No. C-12 to 1. If both these items are set to 0, the slow starting function will not operate.
C-12	Slow Start after sewing machine stops	
C-13	When Slow Starting, change Slow- starting speed	When using the slow start function, this item gives you the option of maintaining the same starting speed or setting up a new speed. If you want to set up a new speed, use items No. C-14~C-18 and set up a new speed.
C-14	When Slow Starting, the operation speed of beginning stitch	When the item No. C-13 set up value is "1", the slow start beginning values (the specific items that change the set up value) are • 1 : 400rpm • 2 : 400rpm • 3 : 640rpm • 4 : 1000rpm • 5 : 1680rpm
C-15	When Slow Starting, the operation speed of second stitch	
C-16	When Slow Starting, the operation speed of third stitch	
C-17	When Slow Starting, the operation speed of fourth stitch	
C-18	When Slow Starting, the operation speed of fifth stitch	

C. Motor maximum speed limit set up method

Item No.	Name of function	Method of use and explanation
C-19	Set up motor maximum speed limit	This function allows you to limit the maximum motor speed, and the starting value is set to 3000 rpm.

[Caution]
If the specific items of the parameter are changed carelessly, they could break down or damage the machine, so the user must be well-trained before using it.

4) Thread Trimming Sequence Function Method of Use (Items no. 54, 55, 56 of Group B)

※ Thread trimming sequence function characteristics

- The thread trimming sequence is a user programming function of PLC control type used for thread trimming or when a special simple repetitive function is required .
- The user composes the thread trimming sequence he wants, and can program the machine or motor's operation during thread trimming.
- When necessary, the user can change it to exclusive mode and can program all types of special operations.
- The program size is 64 bytes, so compose the program within this size limit.
- The program code is composed of the command field and the data field.
- The thread trimming related parameters are items No. 54, 55, 56 from Group B.

Item No.	Function
B-54	This item that provides the function of thread trimming sequence selection which allows the user to select and use the sequence from item No. B-55
B-55	This item provides the function of allowing the user to compose the thread trimming sequence himself.
B-56	This item provides the function of allowing the user to select other company sewing machine models, and makes automatic changes in the thread trimming sequence that fit the selected sewing machine.

(1) Thread Trimming Sequence Function Related Parameter Method of Use and Explanations (Full-Option)

A. Thread Trimming Sequence Data Input Function (Item No. B-55)

① This function allows the user to compose the thread trimming sequence himself. In order to do this, the user must first enter parameter Group B.	Pr 02 00 A B C D E F
② If the screen changes, go to the specific items and choose item No. 55 from Group B. Then the user will see the letter "Seq " blink. (Use buttons **E** , **F**)	SE9 55 A B C D E F
③ If you press the (ENTER) button where it says "Seq 55", you can now choose the thread trimming sequence. In the figure. you can see the command "--80" which indicates the sequence start. The command "01" is a number within the sequence (01~64) of the "--80" command.	--80 01 A B C D E F
④ If you use buttons **E** , **F** to increase the numbers, you can see the sequence that was set up in the start. Their contents are explained below • 01 : "--08" ⇒ Sequence starting code • 02 : "--F3" ⇒ General sequence • 03 : "--00" ⇒ Sequence ending code	--F3 02 A B C D E F
⑤ Now the user can change the sequence function according to his objectives but the remember that the program size cannot exceed 64 bytes. Also you can set up several short sequences and then use the sequences you want by using item No. B-54. When you setting this up, each sequence must always have a starting and ending code. ※Refer to sequence code list	--00 03 A B C D E F

[Caution]
- If you don't press the (ENTER) button after changing the parameter item set up value, the set up value will not be saved, so use caution when using it.
- If the specific items of the parameter are changed carelessly, they could cause breakdown or damage the machine. Therefore, the user must be well-trained before using it.

B. Thread Trimming Sequence Selection Function Method of Use (Item No. B-54)

① This function is used when the user wants to use other sequences apart from the sequences that are basically provided. If you want to use this function, first enter Item No.54 in parameter Group B. Then you will see the screen shown in the figure.	`0    54` A B C D E F
② The starting value is set to "0". If you change this number to a value in the sequence of Item No. B-55, you can now use the extra programmed sequence. (Use the **C** , **D** buttons) (Ex : if you want to use the fourth sequence and change the sequence set up)	`4    54` A B C D E F
③ The user can use Item No. B-55 to save and use several frequently used sequences whenever he needs them.	

[Caution]
- If you don't press the (ENTER) button after changing the parameter item set up value, the set up value will not be saved, so use caution when using it.
- If the specific items of the parameter are changed carelessly, they could cause breakdown or damage the machine. Therefore, the user must be well-trained before using it.

C. Thread Trimming Sequence Automatic Change According to Sewing Machine Model Selection (Item No. B-56)

① This function allows automatic change of thread trimming sequence when user attaches the controller to a sewing machine other than the one being currently used. If you want to use this function, first enter Item No.56 in parameter Group B. You will see then the screen shown in the figure.	`0    56` A B C D E F
② If you press the (ENTER) button after changing the set up value to fit the new sewing machine model number, the matching thread trimming sequence is duplicated. ※Refer to the sewing machine list (Ex : when using the SunStar KM-790BL-7 sewing machine)	`80    56` A B C D E F
③ The duplicated thread trimming sequence can be check in the Item No. B-55 and if you want to change the contents you can do so using Item No. B-55	

[Caution]
- If you don't press the (ENTER) button after changing the parameter item set up value, the set up value will not be saved, so use caution when using it.
- If the specific items of the parameter are changed carelessly, they could cause breakdown or damage the machine. Therefore, the user must be well-trained before using it.

(2) Thread Trimming Sequence Function Related Parameter Method of Use and Explanations (Economic)

A. Changing the Trimming Sequence with the Simplified Operation Panel

When changing the thread trimming sequence by using the simplified operation panel, the method is a bit different from when changing other parameters. Check the following manual and make the changes in a correct manner.

<S- Ⅵ Simplified Operation Panel>
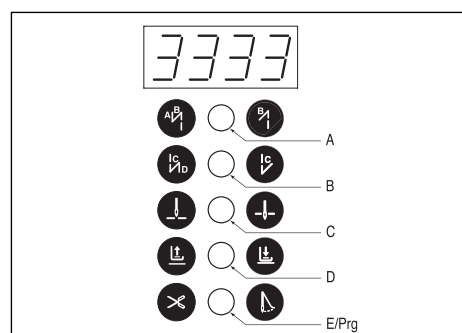
	How to Operate	Display	Remarks
1	Press E/Prg button and A button simultaneously. Then the screen for changing parameters appears.	`PrEn`	• Program Enable
2	Press B button, and it moves to the parameter B group.	`b-01`	• Parameter B-01
3	Use A button and B button to move to the No. 55 trimming sequence of the B group.	`b-55`	• Parameter B-55
4	Press C button when "b-55" is displayed. Then "SEQ" blinks on the screen.	`SEQ`	• Sequence
5	Press C button once again, and the screen displays the starting location number of trimming sequence.	`SEQ`	• -80" : Trimming sequence start command
6	Press A button and B button to change the location number of the current trimming sequence. ex) When A is pressed, "--80" is changed to "--81".	`--80`	• The starting location number of trimming sequence has changed from "--80" to "--81".
7	When C button or D button is pressed, the trimming sequence location number increases or decreases. The screen displays the values stored in the concerned sequence location. ex) When C is pressed, the screen displays "--83", the value which is in the second trimming sequence location.	`--80`	• In case where Model = 88, the "--83" command is stored in the second trimming location.
8	When the trimming sequence change is complete following the above procedure, press E/Prg button to store the sequence.	`SEQ`	• Trimming sequence is stored.
9	[Notice] • Please make sure that in case of a simplified operation panel, the location value of the current trimming sequence is not shown. • Please make sure that in case of a simplified operation panel, the functions of the buttons A, B, C, D, E are a bit different from those when they are used in other context. • In order to exit the trimming sequence change mode, press "E". Then all the changed values will be stored. • If you want to make several changes, press "E" one time after all changes are made to save the changed values.		

(3) Basic Structure of Thread Trimming Sequence Program Code

    A. The thread trimming sequence program code is basically composed of the command field and data field which comes according to the command field. The size of the program cannot exceed 64 bytes.

Explanation of function		Command field	Data field		
			1st	2nd	3rd
PosStopUp	Needle plate up-stop after sewing given stitch numbers at given speed.	CEH	0~5000[rpm](20rpm)	0~255[stitch]	

    B. The table above is an example of the program code structure. If you want to use the function "Needle plate up-stop after sewing given stitches at given speed" you must first select the command code "CEH" and set up the data value according to the command code. In other words, the given sewing speed is the first data and the given stitch numbers is the second data and both of these form the data field. Depending on the command code, there can exist a data field or exist three data in the data field.

(4) Thread Trimming Sequence Program Code List

Category	Explanation		Cmd Field	Data Field		
				1st	2nd	3rd
Output Port Control (Total 40)	B/T Solenoid	On	81H			
	P/F Solenoid	On	82H			
	T/T Solenoid	On	83H			
	W/P Solenoid	On	84H			
	T/R Solenoid	On	85H			
	Left Solenoid	On	86H			
	Right Solenoid	On	87H			
	AUX Solenoid	On	88H			
	Left LED	On	89H			
	Right LED	On	8AH			
	Needle Up Signal	On	8BH			
	Needle Down Signal	On	8CH			
	Motor Runing Signal	On	8DH			
	Reaching Target Speed Signal	On	8EH			
	Motor Trimming Signal	On	8FH			
	Motor End Tacking Signal	On	90H			
	Emergency Stop Signal	On	91H			
	Roller Lift Solenoid	On	92H			
	Hemming Device Output	On	93H			
	Pedal Forward Step1 Signal	On	94H			
	B/T Solenoid	Off	98H			
	P/F Solenoid	Off	99H			
	T/T Solenoid	Off	9AH			
	W/P Solenoid	Off	9BH			
	T/R Solenoid	Off	9CH			
	Left Solenoid	Off	9DH			
	Right Solenoid	Off	9EH			
	AUX Solenoid	Off	9FH			
	Left LED	Off	A0H			
	Right LED	Off	A1H			
	Needle Up Signal	Off	A2H			
	Needle Down Signal	Off	A3H			
	Motor Runing Signal	Off	A4H			
	Reaching Target Speed Signal	Off	A5H			
	Motor Trimming Signal	Off	A6H			
	Motor End Tacking Signal	Off	A7H			
	Emergency Stop Signal	Off	A8H			
	Roller Lift Solenoid	Off	A9H			
	Hemming Device Outout	Off	AAH			
	Pedal Forward Step1 Signal	Off	ABH			
Time Delay	Delay by 1[ms] unit		B0H	0~255[ms] (1ms)		
	Delay by 2[ms] unit		B1H	0~510[ms] (2ms)		
	Delay by 4[ms] unit		B2H	0~1020[ms] (4ms)		
	Delay by 0.5[s] unit		B3H	0~127.5[s] (0.5s)		

Category		Explanation	Cmd Field	Data Field		
				1st	2nd	3rd
Motor Control	On Hold	Motor—Holding Start	C0H			
	Off Hold	Motor—Holding Stop	C1H			
	Set Dir CW	Set CW direction)	C2H			
	Set Dir CCW	Set CCW direction)	C3H			
	Set Speed	Make Motor Run with given Speed	C4H	0~5000 [spm] (20spm)		
	Set SpdByPed	Make Motor Run with Speed given by pedal	C5H			
	Up Stop	Make Stop in Needle Up (stop)	C6H			
	DN Stop	Make Stop in Needle Down (stop)	C7H			
	Up Stop InSpd	Make Up Stop with given Speed (stop)	C8H	0~500 [spm]	(2spm)	
	Dn Stop InSpd	Make Dn Stop with given Speed (stop)	C9H	0~500 [spm]	(2spm)	
	Dacc Up Edge	Decel. in Speed at Up Edge (not stop)	CAH	0~500 [spm]	(2spm)	
	Dacc Dn Edge	Decel. in Speed at Dn Edge (not stop)	CBH	0~500 [spm]	(2spm)	
	Move Up Edge	Move to Up Edge with given Speed (not stop)	CCH	0~500 [spm]	(2spm)	
	Move DnEdge	Move to Dn Edge with given Speed (not stop)	CDH	0~500 [spm]	(2spm)	
	Pos Stop Up	Up Stop after sewing given stitch with given Speed	CEH	0~5000 [spm] (20spm)	0~255 [stitch]	
	Pos Stop Dn	Dn Stop after sewing given stitch with given Speed	CFH	0~5000 [spm] (20spm)	0~255 [stitch]	
	Pos Dacc Up	Dacc Dn Edge after sewing given stitch with given Speed	D0H	0~5000 [spm] (20spm)	0~500 [spm] (2spm)	0~255 [stitch]
	Pos Dacc Dn	Dacc Up Edge after sewing given stitch with given Speed	D1H	0~5000 [spm] (20spm)	0~500 [spm] (2spm)	0~255 [stitch]
	L Move Stop	Move given distance with given Speed	D2H	0~ 500 [spm]	(2spm)	0~357 [deg]
	SpdInPos	Make motor given Speed in given Position	D3H	0~5000 [spm] (20spm)	0~357 [deg]	
	Random Stop	Stop randomly	D4H			
Position /Speed Check	Wait Pos1	When position aleady passed, return	E0H	0~357 [deg]		
	Wait Pos2	When position aleady passed, wait next position and then return	E1H	0~357 [deg]		
	Wait Up Edge	Wait until Up Edge detected.	E2H			
	Wait Dn Edge	Wait until Dn Edge detected	E3H			
	Chk Pos	Check the posiiton passed & branch to the address	E4H	0~357 [deg]	0~64 (address)	
	Chk Up Edge	Check Up Edge detected & branch to the address	E5H	0~64 (address)		
	Chk Dn Edge	Check Dn Edge detected & branch to the address	E6H	0~64 (address)		
	Clr Up Edge	Clear Up Edge FG (mark UpEdge not detected)	E7H			
	Clr Dn Edge	Clear Dn Edge FG (mark DnEdge not detected)	E8H			
	Wait Speed	Wait until motor speed is target speed	E9H	0~5000 [spm] (20spm)		
	Chk Speed	Check if motor speed is target speed & branch to the address	EAH	0~357 [deg]	0~64 (address)	

Category	Explanation			Cmd Field	Data Field		
					1st	2nd	3rd
Input Port Check WaitPort	Wait until the port signal detected		Button A	F0H	0 (Input Port No)		
			Button B		1		
			Switch 1/4 stitch		2		
			Switch 2/4 stitch		3		
			Switch 3/4 stitch		4		
			Switch 4/4 stitch		5		
			Left Solenoid Switch		6		
			Right Solenoid Switch		7		
			Pressor Foot Lift Switch		8		
			Counter Switch		9		
			Button 1/2 switch on P/U Box		10		
			Safety Switch		11		
			Edge Sensor		12		
			Trimming Disable Switch		13		
			Roller lift Switch		14		
			N-AUTO Switch		15		
			Pedal Start Input		16		
			Pedal Pressor-Foot Input		17		
			Pedal Thread Trimming Input		18		
			External Input		19		
	BrChkPort (Check the port and branch the given address)		Button A	F1H	0 (Port No)	0~64 (address)	
			Button B		1	0~64	
			Switch 1/4 stitch		2	0~64	
			Switch 2/4 stitch		3	0~64	
			Switch 3/4 stitch		4	0~64	
			Switch 4/4 stitch		5	0~64	
			Left Solenoid Switch		6	0~64	
			Right Solenoid Switch		7	0~64	
			t Switch		8	0~64	
			Counter Switch		9	0~64	
			Button 1/2 switch on P/U Box		10	0~64	
			Safety Switch		11	0~64	
			Edge Sensor		12	0~64	
			Trimming Disable Switch		13	0~64	
			Roller lift Switch		14	0~64	
			N-AUTO Switch		15	0~64	
			Pedal Start Input		16	0~64	
			Pedal Pressor-Foot Input		17	0~64	
			Pedal Thread Trimming Input		18	0~64	
			External Input		19	0~64	
Sequence Control	Branch		Branch to given address	F2H	0~64 (Address)		
	GenSeq		General Trimming Sequence	F3H			
	StartSeq		Start of the sequence	80H			
	EndSeq		End of the sequence	00H			

[Caution]
- Every the conditional Branch is made to the appropriate number when it is on "No(False)"
- When makingthe sequence program, please check and use its function because the wrong sequence program can cause the mechanical trouble and the physical damage.

(5) Examples of the Function of Thread Trimming Sequence

● Yamato Three-needle Trimming

① Timing of Thread Trimming Sequence
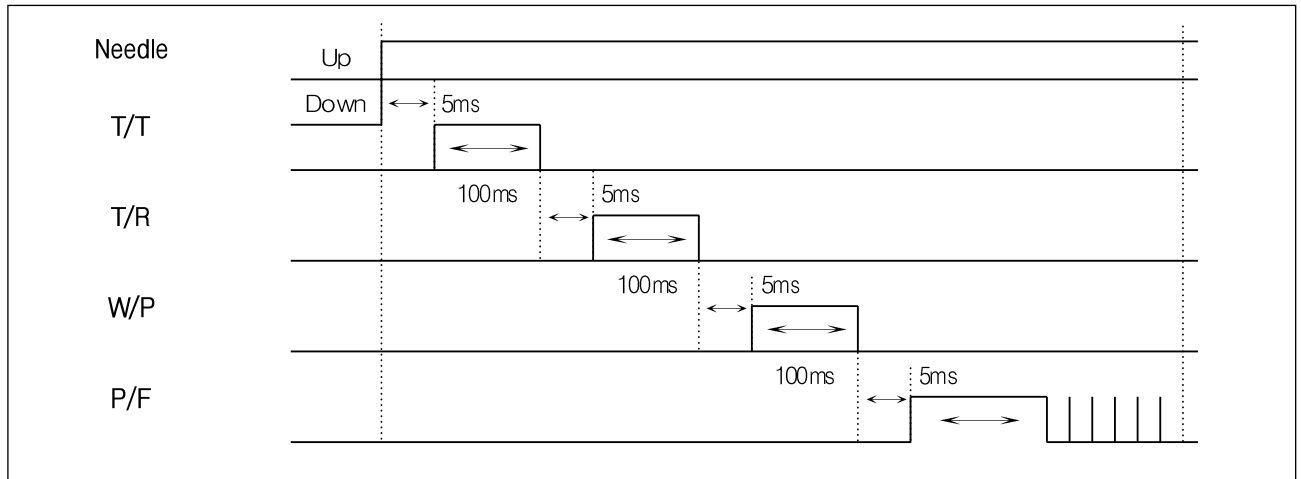
② Flow Chart of Tread Trimming Sequence & Program Code

Flow chart	Code number	Comm. field	Data field			Explanation
			1st	2nd	3rd	
START of Sequence	01	——80				Start of Sequence
	02	——C8				Stop after moving to needle of upstop at 200spm
Needle Up Stop with 200spm	03		200			
wait for 5ms	04	——B0				Wait for 5[ms]
	05		5			
T/T sol. on	06	——83				Thread Trimming solenoid , On
wait for 100ms	07	——B0				Wait for 100[ms]
	08		100			
T/T sol. off	09	——9A				T/T sol.(off)
wait for 5ms	10	——B0				Wait for 5[ms]
	11		5			
T/R sol. on	12	——85				T/R sol.(on)
wait for 100ms	13	——B0				Wait for 100[ms]
	14		100			
T/R sol. off	15	——9C				T/R sol.(off)
wait for 5ms	16	——B0				Wait for 5[ms]
	17		5			
W/P sol. on	18	——84				W/P sol.on(on)
wait for 100ms	19	——B0				Wait for 100[ms]
	20		100			
W/P sol. off	21	——9B				Wiper solenoid off
wait for 5ms	22	——B0				Wait for 5[ms]
	23		5			
End of Sequence	24	——00				End of Sequence

※ Operates Presser Foot Solenoid by "Lefting Up function of Automatic Presser Foot after Trimming" being set to A18=1
※ As every command field is displayed close to "--", it is distinguishable from Data Field
※ All Data Fields are displayed easily enough to distinguish them from others, differently from S-II and there's no necessity of transforming the number and conversing the unit

(6) List of Codes by Machine Model – (able to choose from No. 56 of GROUP "B")

NO.	TYPE of Sewing	T/T Solenoid type	Sewing Machine	ORDER NO.	GROUP A						GROUP B		GROUP C	PROGRAM UNIT SETTING						SYNC.	PULLEY SIZE
					A2	A3	A7	A8	A24	A65	B16	B56	C61	S.B/T	E.B/T	NEEDLE	P/F	T/T	W/P		
1	SINGLE	CAM	KM-2300MG , KM-2310MG	S4AC50-□A□-001	4000	300	1700	1700		1	20	0	20	ON	ON	DOWN	DOWN	ON	ON		
2			KM-2300SG, KM-2300MB, KM-2310MB	S4AC50-□A□-002	4000	300	1700	1700		1	20	76	20	ON	ON	DOWN	DOWN	ON	ON		
3			KM-2300MH, KM-2300MA, KM-2300SA	S4AC50-□A□-003	4000	300	1700	1700		1	20	77	20	ON	ON	DOWN	DOWN	ON	ON		
4			KM-2300FG	S4AC50-□A□-004	3520	300	1700	1700		1	20	78	20	ON	ON	DOWN	DOWN	ON	ON		
5			KM-2300FA	S4AC50-□A□-005	3520	300	1700	1700		1	20	79	20	ON	ON	DOWN	DOWN	ON	ON		
6			KM-1750MG	S4AC50-□AF-007	3000	180	800	800		1	50	80	120	ON	ON	DOWN	DOWN	ON	ON		
7			KM-1750MBL, KM-1751BL	S4AC50-□AF-008	3000	180	800	800		1	50	81	120	ON	ON	DOWN	DOWN	ON	ON		
8	Double	CAM	KM-1750SF	S4AC50-□AF-009	2600	180	800	800		1	50	82	120	ON	ON	DOWN	DOWN	ON	ON		
9			KM-1790MG	S4AC50-□AF-010	2800	180	800	800		1	50	83	120	ON	ON	DOWN	DOWN	ON	ON		
10			KM-1790MBL	S4AC50-□AF-011	2600	180	800	800		1	50	84	120	ON	ON	DOWN	DOWN	ON	ON		
11			KM-1791BL	S4AC50-□AF-012	2800	180	800	800		1	50	85	120	ON	ON	DOWN	DOWN	ON	ON		
12	CHAIN	AIR	SC-7300	S4AC50-□DE-006	4000	200	1600	1600		1	50	88	111	OFF	OFF	UP	DOWN	ON	ON		
13	CHAIN	AIR	SC-7300 (for tinsel trimming)	S4AC50-□DE-007	4000	200	1600	1600		1	50	123	111	OFF	OFF	UP	DOWN	ON	ON		
14	CHAIN	AIR	SF-7500	S4AC50-□DE-008	5000	200	1600	1600		1	50	124	111	OFF	OFF	UP	DOWN	ON	ON		
15	CHAIN	AIR	SC-7310	S4AC50-□DE-009	4000	200	1600	1600		1	50	125	111	OFF	OFF	UP	DOWN	ON	ON		

11

BREAKDOWN AND TROUBLESHOOTING

※ If the machine breaks down while using the servo motor due to an unforseen change in the machine, the error indicators mentioned below will appear in the displayer of the program unit or simple program unit according to the self-checking function of the machine. The machine will then stop along with the sound of a warning buzzer. When an error indicator appears, follow the solution steps described below and resume work. If the problem is not solved after taking these measures, contact a company branch office.

Order	Error indicator	Cause of breakdown	Troubleshooting
1	SF22 Er	Safety switch error	• Check safety switch cable and connector
2	PU26 Er	Trouble with program unit connection	• Check program unit cable and connector
3	PU27 Er	Trouble with simple program unit connection	• Check the simple program unit cable and connector
4	60 Er	This error sign is seen when the user connects the location sensor while the power is still on	• Turn the power off and on again before using it.
5	61 Er	This error sign is seen when the user the user removes the location sensor while the power is still on	• Turn the power off and on again before using it.
6	126 Er	This error sign is seen when the motor's rotor magnet and stator coil's electric current flow does not match	• Check the condition of the motor's
7	127 Er	This error sign appears when the direction of encoders R S T and the direction of A B do not match.	• Check the encoder cable and the connector
8	128 Er	When there is no signal from encoders R S T	• Check the encoder cable and the connector
9	129 Er	When the motor is overloaded	• Turn the machine manually and check the machine load
10	130 Er	When there is no signal from the location sensor	• Check the location sensor cable and connector
11	131 Er	When there is an electric current overflow in the motor and problems with the connector	• Check the motor cable and the connector
12	133 Er	When theelectric current overflow of the IPM stops	• Turn the power off and on again before using it.
13	135 Er	High-voltage error	• Power-off and input power check

12

HOW TO PLACE FOR CONTROLLER

S4AC50 - ☐☐☐ - ☐☐☐

a : Sub classification according the details of
the medal
b : Distinction of the SunStar models from
others

E : Economic Type
F : Full Option Type

A : Sunstar KM-2300 Series, 235A/B, 250A/B ...
D : SunStar SC-7300 Series ... (Chain Stitch)

1 : 1Phase 110[V]
2 : 1Phase 220[V]
3 : 3Phase 220[V]
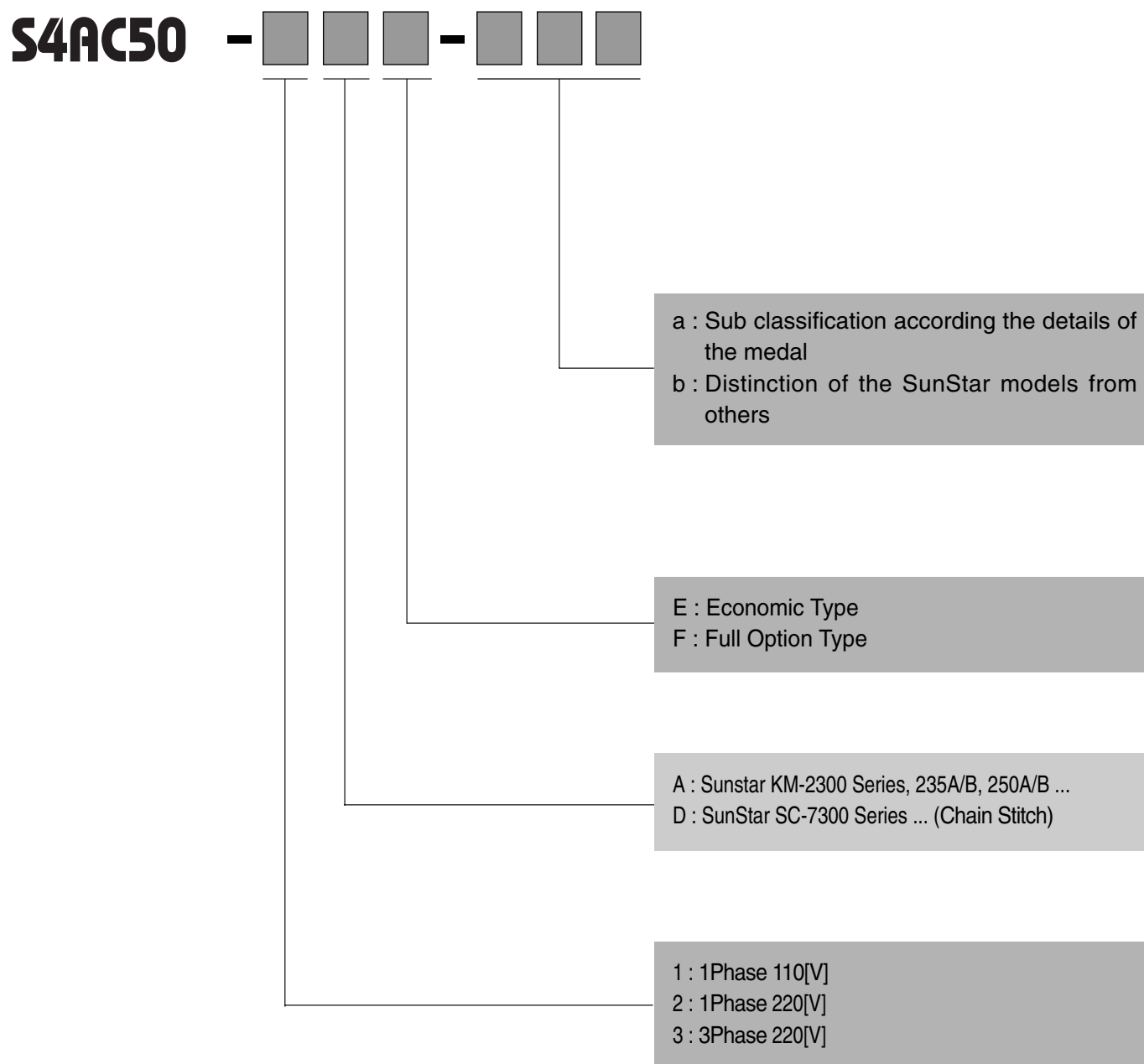
OREDER Ex. S4AC50-2AF refers to SERIES4, 1Phase 220V, FULL FUNCTION
CONTROL BOX for normal drop feed.

13
BLOCK DIAGRAM

FORTUNA
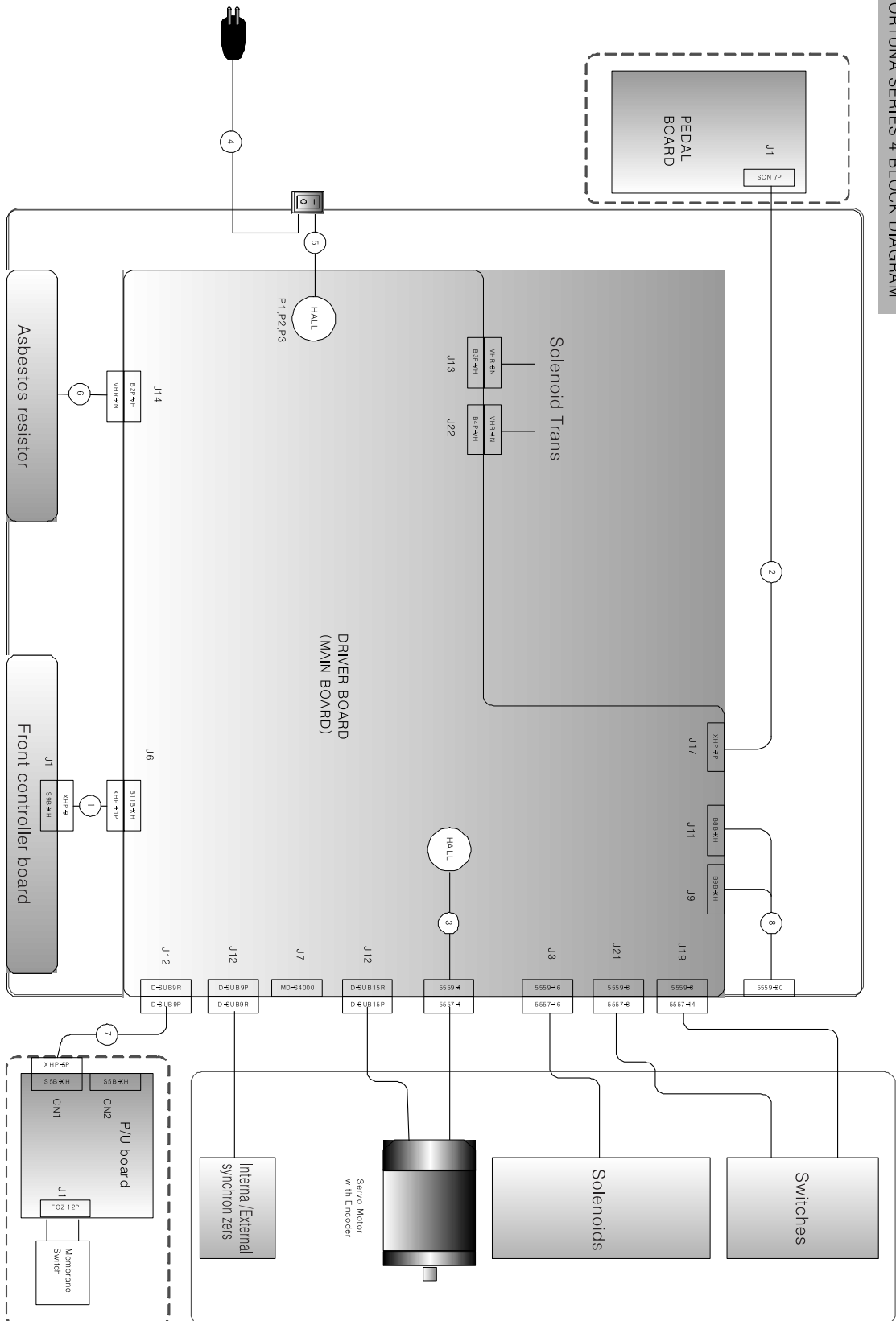
AC Servo Series **4**

PARTS BOOK

CONTENTS

• Remarks •

Please let us get the additional details according to the itemized list below for the better service when ordering spare parts for SunStar motors.

※Order for spare parts for servo motor
   1) Serial number
   2) Type of control box & model name
   3) Electric specification (Phase, Volt, Hz)
   4) Machines's model name

Motor Mechanism

SunStar

A-1

A-2

A-3

Ref. No.	Parts No.	Note	Name of Parts	품 명	Q' ty	Assembly No.
A-1	05-001A-SE50		Motor Ass'y [단축]	Motor Ass'y [단축]	1	
A-2	05-002A-SE50		Motor Ass'y [양축]	Motor Ass'y [양축]	1	
A-3	05-001S-SE50		Model Sticker	모델 스티커	1	

B-29
B-29
B-27
B-28
B-21
B-35
B-8
B-8
B-8
B-8
B-8
B-8
B-1
B-6
B-7
B-22
B-3
B-4
B-5
B-5
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B-25
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B-19
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B-19
B-18
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B-20
B-20
B-18
B-31
B-31
B-18
B-32
B-36
B-24
B-34

Ref. No.	Parts No.	Note	Name of Parts	품 명	Q' ty	Assembly No.
B-1	06-111A-SE50		Control Box	콘트롤 박스	1	
B-2	06-009A-SE50		Resistor	저항	1	
B-3	06-001B-SE50		Fixing Rubber for Resistor	저항 고정 고무	1	
B-4	06-002B-SE50		Fixing Bracket for Resistor	저항 고정 브라켓	1	
B-5	10-021M-SW66		Fixing Bracket Screw for Resistor (M3×L6)	저항 고정 브라켓 쬠나사 (조) (M3×L6)	2	
B-6	13-005A-SE50		Resistor Connect	저항 커넥터	1	
B-7	06-007A-SE50		Transformer	트랜스	1	
B-8	06-001C-SE50		Transformer Screw (M4×L6)	트랜스 쬠나사 (M4×L6)	4	
B-16	08-002M-SW66		Stud for DRV(Driver) Board (M3-L5-L10)	드라이버 보드 스터드 (M3-L5-L10)	5	
B-17	01-0000-SE50		DRV(Driver) Board	드라이버 보드	1	
B-18	10-021M-SW66		Screw for DRV(Driver) Board (M3×L6)	드라이버 보드 쬠나사 (조) (M3×L6)	5	
B-19	10-003M-PT10		Screw for IPM (M4×L10)	IPM 쬠나사 (M4×L10)	2	
B-20	06-003C-SE50		Screw for Bridge Diode (M4×L15)	브리지다이오드 쬠나사 (M4×L15)	2	
B-21	06-005B-SE50		Guide Rubber for Cable	케이블 가이드 고무	2	
B-22	06-006A-SE50		Front Cover for Control Box	콘트롤 박스 전면 커버	1	
B-23	06-005A-SE50		Rear Cover for Control Box	콘트롤 박스 후면 커버	1	
B-24	06-114A-SE50		Front Cover for Control Box	콘트롤 박스 측면 커버	1	
B-25	06-004C-SE50		Screw for Control Box Cover (M4×L10)	콘트롤 박스 커버 쬠나사 (M4×L10)	8	
B-26	91-001A-SE50		ON/OFF Switch	전원 스위치	1	
B-27	06-006B-SE50		Cable Cover A	케이블 커버 A	1	
B-28	06-007B-SE50		Cable Cover B	케이블 커버 B	1	
B-29	11-002S-5050		Screw for Cable Cover (ST2.9×L8)	케이블 커버 쬠나사 (ST2.9×L8)	2	
B-30	13-001A-SE50		Power Source Cable 1 (1~220V)	전원 입력 케이블 1 (1~220V)	1	
B-30-1	13-100A-SE50		Power Source Cable 1 (3~220V)	전원 입력 케이블 1 (3~220V)	1	
B-30-2	13-101A-SE50		Power Source Cable 1 (1~110V)	전원 입력 케이블 1 (1~110V)	1	
B-31	13-002A-SE50		Power Source Cable 2	전원 입력 케이블 2	1	
B-32	13-003A-SE50		Servo Motor Output Cable	서보 모터 출력 케이블	1	
B-33	11-002S-5050		Screw for Control Box (ST5.5×L15)	콘트롤 박스 쬠나사 (ST2.9×L8)	4	
B-34	01-003S-BT01		Principle Sticker	주의 스티커	1	
B-35	GP-011331-00		Model Sticker	모델 스티커	1	
B-36	13-006A-SE50		Option Cable	옵션 중간 연결 케이블	1	
B-37	01-025B-SE50		Gappad 1500-125(25×20)		1	

Control Box Mechanism (Economic Type)

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Ref. No.	Parts No.	Note	Name of Parts	품　　　　　명	Q'ty	Assembly No.
C-1	06-111A-SE50		Control Box	콘트롤 박스	1	
C-2	06-009A-SE50		Resistor	저항	1	
C-3	06-001B-SE50		Fixing Rubber for Resistor	저항 고정 고무	1	
C-4	06-002B-SE50		Fixing Bracket for Resistor	저항 고정 브라켓	1	
C-5	10-021M-SW66		Fixing Bracket Screw for Resistor（M3×L6）	저항 고정 브라켓 쬼나사 (조) (M3×L6)	2	
C-6	13-005A-SE50		Resistor Connect	저항 커넥터	1	
C-7	06-007A-SE50		Transformer	트랜스	1	
C-8	06-001C-SE50		Screw （M4×L8）	볼트(M4×L8) 접시	4	
C-9	06-008A-SE50		Display Panel	디스플레이 패널	1	
C-10	06-003B-SE50		Sticker for Display Panel A	디스플레이 패널 스티커 A	1	
C-11	06-004B-SE50		Sticker for Display Panel B	디스플레이 패널 스티커 B	1	
C-12	07-004S-SM5S		Screw for Encorder Cover （M4×L10）	엔코더 커버 고정나사 (조) (M4×L10)	2	
C-13	03-0000-SE50		PCB Board	전면 조작반 보드	1	
C-14	06-005C-SE50		Screw for PCB Board (ST2.9×L6)	전면 조작반 보드 쬼나사 (ST2.9×L6)	3	
C-15	13-004A-SE50		PCB Cable	전면 조작반 케이블	1	
C-16	08-002M-SW67		Stud for DRV(Driver) Board(M3-L5-L10)	드라이버 보드 스터드(M3-L5-L10)	5	
C-17	01-0000-SE50		DRV（Driver) Board	드라이버 보드	1	
C-18	10-021M-SW66		Screw for DRV(Driver) Board (M3×L6)	드라이버 보드 쬼나사 (조) (M3×L6)	5	
C-19	07-004S-SM5S		Screw for Encorder Cover （M4×L10）	엔코더 커버 고정나사 (조) (M4×L10)	2	
C-20	01-003S-2070		Screw （M4×L16）	다이오드 쬼나사 (M4×L16)	2	
C-21	06-005B-SE50		Guide Rubber for Cable	케이블 가이드 고무	2	
C-22	06-002A-SE50		Front Cover for Control Box	콘트롤 박스 전면 커버	1	
C-23	06-003A-SE50		Rear Cover for Control Box	콘트롤 박스 후면 커버	1	
C-24	06-114A-SE50		Front Cover for Control Box	콘트롤 박스 측면 커버	1	
C-25	10-003M-PT01		Screw Control Box Cover(M4×L8)	커버조임나사 트러스 (M4×L8)	8	
C-26	91-001A-SE50		ON/OFF Switch	전원 스위치	1	
C-27	06-006B-SE50		Cable Cover A	케이블 커버 A	1	
C-28	06-007B-SE50		Cable Cover B	케이블 커버 B	1	
C-29	11-002S-5050		Screw for Cable Cover （ST2.9×L8）	케이블 커버 쬼나사 (ST2.9×L8)	2	
C-30	13-001A-SE50		Power Source Cable 1 (1~220V)	전원 입력 케이블 1 (1~220V)	1	
C-30-1	13-100A-SE50		Power Source Cable 1 (3~220V)	전원 입력 케이블 1 (3~220V)	1	
C-30-2	13-101A-SE50		Power Source Cable 1 (1~110V)	전원 입력 케이블 1 (1~110V)	1	
C-31	13-002A-SE50		Power Source Cable 2	전원 입력 케이블 2	1	
C-32	13-003A-SE50		Servo Motor Output Cable	서보 모터 출력 케이블	1	
C-33	11-002S-5050		Screw for Control Box (ST5.5×L15)	콘트롤 박스 쬼나사 (ST2.9×L8)	4	
C-34	01-003S-BT01		Principle Sticker	주의 스티커	1	
C-35	06-001S-SE50		Model Sticker	모델 스티커	1	
C-36	01-025B-SE50		Gappad 1500-125(25×20)		1	

Program Unit Mechanism

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D-11 : Bracket for KM-1750/1790

Ref. No.	Parts No.	Note	Name of Parts	품 명	Q'ty	Assembly No.
D-1	02-0000-SE50		P/U(Program Unit) Board	P/U(프로그램 유닛) 보드	1	
D-2	13-007A-SE50		Cable for P/U Box	P/U연결 케이블	1	
D-3	15-026M-1000		Cable Tie	케이블 타이	1	
D-4	02-001A-SE50		Membrane	멤브레인	1	
D-5	02-002A-SE50		Front Cover for P/U	P/U 전면 커버	1	
D-6	02-003A-SE50		Rear Cover for P/U	P/U 후면 커버	1	
D-7	11-002S-5050		Screw for Cover (ST2.9×L8)	커버 죔나사 (ST2.9×L8)	7	
D-8	91-200A-SE50		P/U Bracket (KM-2300)	P/U 브라켓 (KM-2300용-)	1	
D-9	06-001C-SE50		Screw for P/U (M4×L6)	P/U 죔나사 (M4×L6)	3	
D-10	91-001C-SE50		Screw for P/U Bracket (3/16 n=28, D=6, H=3, L=11)	P/U 브라켓 죔나사(3/16 n=28, D=6, H=3, L=11)	3	
D-11	GP-012447-00		P/U Bracket (KM-1750/1790)	P/U 브라켓 (KM-1750/1790용-)	1	

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Pedal Mechanism

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Series IV cable

Series III cable

Ref. No.	Parts No.	Note	Name of Parts	품 명	Q' ty	Assembly No.
E-1	04-0000-SE50		Pedal Unit Assembly	페달 유닛 (조)	1	
E-2	11-011A-SF55		Pedal Base	페달 베이스	1	
E-3	11-1000-4701		Pedal Board	페달 보드	1	
E-4	10-028S-SC53		Screw for Pedal Unit (M3×L5)	페달 보드 죔나사 (조) (M3×L5)	3	
E-5	13-007A-SE50		Cable for Pedal Unit	페달 입력 케이블	1	
E-6	08-015C-3701		Cord Push	케이블 잡이	1	
E-7	10-016A-SC53		Spring Housing	스프링 하우징	1	
E-8	10-024P-SC53		Spring Guide (A)	스프링 가이드 A	1	
E-9	10-025P-SC53		Spring Guide (B)	스프링 가이드 B	1	
E-10	10-019G-SC53		Pressure Spring for Pressure Foot	노루발 압력 스프링	1	
E-11	10-020G-SC53		Pressure Spring for Thread Trimming	사절 압력 스프링	1	
E-12	10-029P-SC53		Stopper for Pressure Spring (A)	압력 스프링 스토퍼 A	1	
E-13	10-030P-SC53		Stopper for Pressure Spring (B)	압력 스프링 스토퍼 B	1	
E-14	10-021S-SC53		Pressure Control Screw (M4×L10)	압력 조절 나사 (M4×L10)	2	
E-15			Pressure Control Nut (M4)	압력 조절 너트(M4)	2	
E-16			Spring Washer for Pressure Control (Ø4)	압력 조절 스프링 와셔 (Ø4)	2	
E-17	10-031W-SC53		Washer for Pressure Control (Ø4)	압력 조절 평 와셔 (Ø4)	2	
E-18	10-031S-SC53		Screw for Spring Housing (M4×L6)	스프링 하우징 죔나사 (M4×L6)	2	
E-19	11-012C-3701		Bushing for Pedal Control Lever	페달 콘트롤 레버 부싱	2	
E-20	10-017A-SC53		Pedal Control Lever	페달 콘트롤 레버	1	
E-21	10-025A-SC53		Shaft for Pedal Control Lever	페달 콘트롤 레버 축	1	
E-22	03-004S-SM5S		Screw for Pedal Control Lever (M5×L6)	페달 콘트롤 레버 죔나사 (M5×L6)	1	
E-23	10-024P-3701		Fixing Pin for Pedal Control Lever(Ø4×L10)	페달 콘트롤 레버 고정 핀 (Ø4×L10)	1	
E-24	10-024W-SC53		Flat Washer for Pedal Shaft (Ø8)	페달 축 평와셔 (Ø8)	1	
E-25	10-026A-SC53		Base for Pedal Magnet & Film	페달 마그네트 & 필름 베이스	1	
E-26	10-027C-SC53		Pedal Magnet	페달 마그네트	1	
E-27	03-004S-SM5S		Base Screw for Pedal Magnet&Film (M5×L6)	페달 마그네트&필름 베이스 죔나사 (M5×L6)	2	
E-28	10-018G-SC53		Tension Spring for Pedal	페달 인장 스프링	1	
E-29	10-033C-SF55		Rubber Cap for Pedal Base	페달 베이스 고무마개	2	
E-30	91-003A-SE50		Pedal Control Rod Assembly (L300×L300)	페달 연결 롯드 (조) (L300×L300)	1	
E-31	07-027S-SE55		Pedal Screw(M5×L10)	페달 죔나사 (조) (M5×L10)	4	
E-32	04-001A-SE50		Pedal Bracket	페달 브라켓	1	
E-33	04-001C-SE50		Screw for Pedal Bracket (ST5.5×L15)	페달 브라켓 죔나사(ST5.5×L15)	4	
E-34	EA-000023		Edge Sensor Box Ass'y	Edge Sensor 박스 (조)	1	